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ELECTRICAL WORLD

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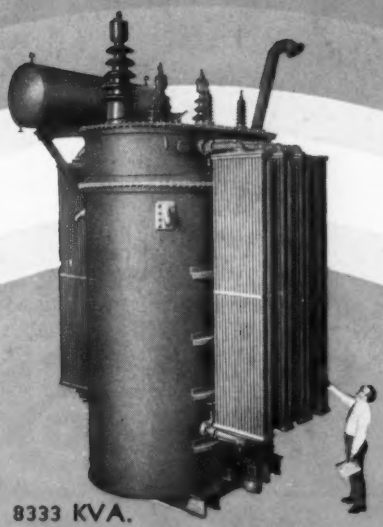

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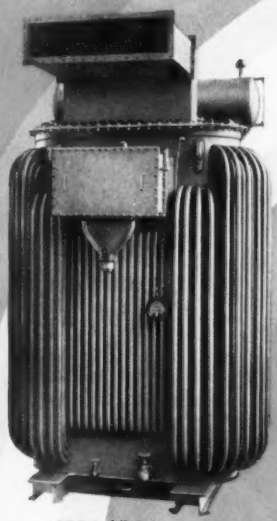

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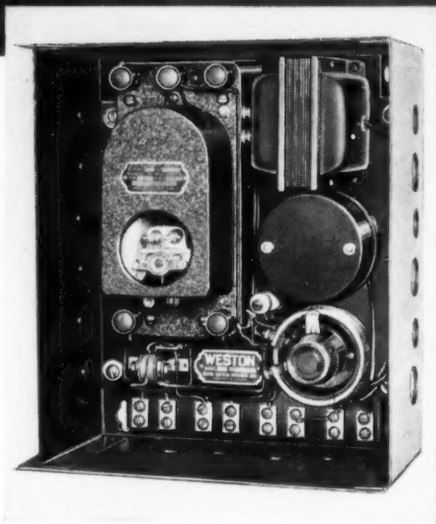

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Western Editor
520 N. Michigan Ave.
Chicago
H. S. KNOWLTON
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Earth borer digging pole holes in frozen ground —Wisconsin

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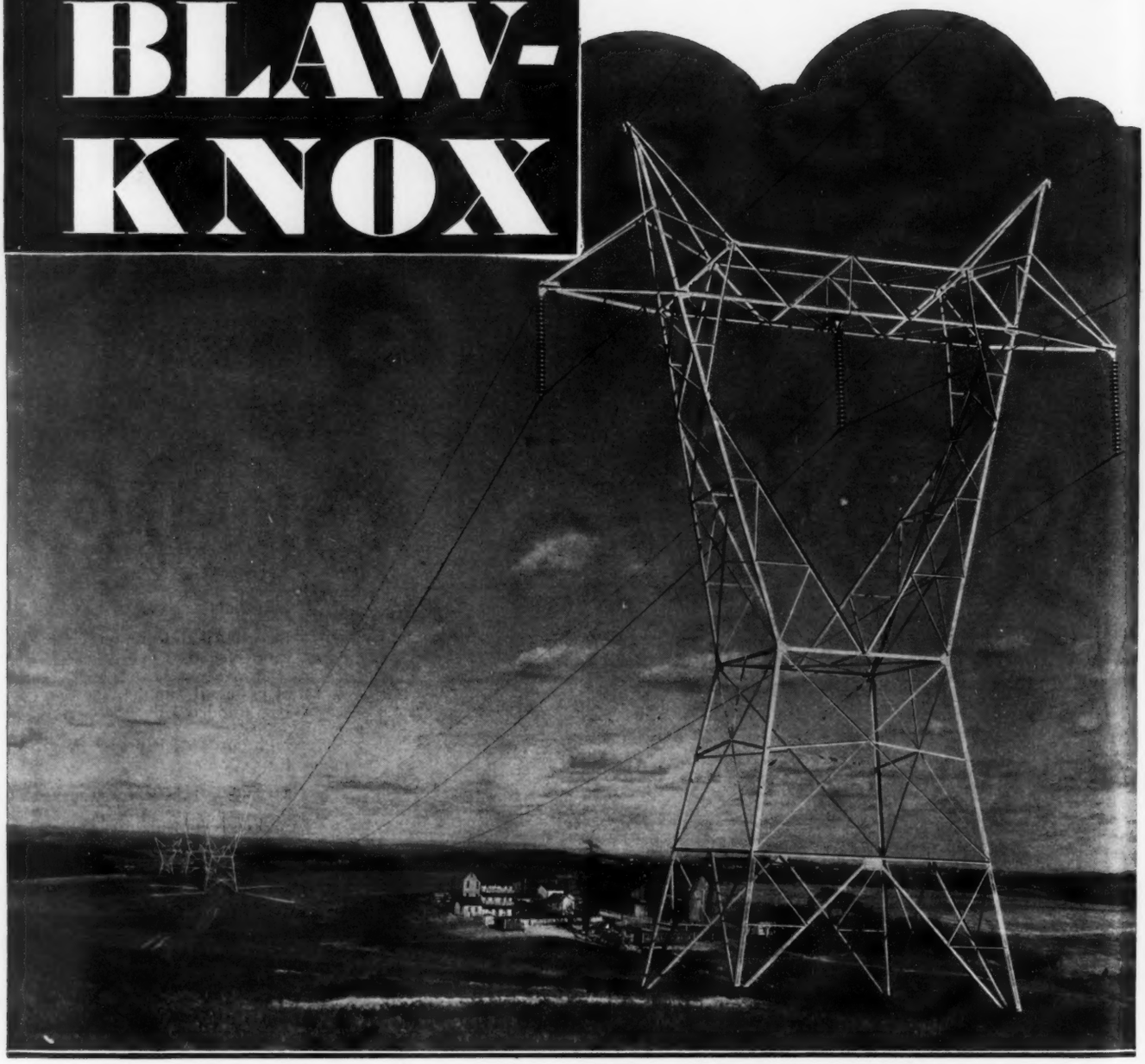

The illustration above shows Blaw-Knox Transmission Towers on the 220,000 volt transmission line between Safe Harbor, Pa., and Baltimore, Md., built by the Pennsylvania Water & Power Company of Baltimore.

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ELECTRICAL WORLD

Established 1883. McGraw-Hill Publishing Company, Inc.

for the Week Ending

April 16, 1932

I own some of its stock and my children do, which was bought at prices to average around 50. It now sells at about 5.

RICHARD WHITNEY,
President
New York Stock Exchange

[That the insiders knew when to sell was but one of the popular fallacies refuted by Mr. Whitney in his testimony before the Senate banking and currency committee this week.]

Sell the home, not the appliance!

—**Try one-shot merchandising** if the limitations which today surround and suppress the development of electrical home markets are to be licked. Multiple appliance sales on a co-operative plan—*p. 688.*

—**Demand metering is important** and will become more so if the investment per customer continues to rise and the costs of generating a kilowatt-hour continue to decrease. Effect on rates reviewed—*p. 697.*

Utility commissioners meet advisers

—**"Liberals" gather to discuss** utility regulatory problems in closed meeting without the presence of representatives of the industry. Federal regulation is urged once more—*p. 675.*

—**Elevators used on networks** must be so arranged that a coordination of the two elements is obtained. Advantages and disadvantages reviewed by an Otis engineer—*p. 704.*

—**Television limitations listed** by Radio Manufacturers' Association. Five important obstacles must be overcome, states report, before satisfactory home entertainment arrives—*p. 683.*

—**Middle West situation pends** as a definite plan awaits evolution. Utilities Securities Company reorganized. Receiver asked for United Public Service Company following default of April 1 interest—*p. 678.*

Dual-rated arresters developed

—**Either 204 or 240 kv. rating** is automatically obtained at substation of Baltimore utility where lightning arresters on 220-kv. line protect themselves as well as the equipment—*p. 683.*

—**Photronic cell aids lighting** by making measurement of intensities a direct-reading operation. Recent development responds to color and light stimuli as does the human eye—*p. 692.*

Insull readjustments proceed

Agitation in Pennsylvania for Reduction of Rates

Commission orders immediate state-wide investigation — West Pennsylvania cities want street-lighting costs lowered.

Immediate investigation of electric light and power rates in the entire State of Pennsylvania, with special attention to domestic rates, was ordered on April 6 by the Public Service Commission. The investigation will be under the supervision of Commissioners George W. Woodruff and Samuel Walker, who will make their report to the board. The electric companies will be called upon to submit figures not only as to rates, but as to capital, operating expenses and other details that enter into rate making.

This action of the commission followed a second defeat for the Woodruff resolution calling for a domestic rate not to exceed 5 cents per kilowatt-hour. Last week Commissioners Walker, S. Ray Shelby and Chairman Ainey voted against that resolution and Commissioners Woodruff, Frederick P. Gruenberg and J. W. Brown for it. Commissioner Emerson L. Collins, who has been incapacitated for many months, was absent. The vote was identical with that taken on January 13 last. After it had been voted down again last week, Commissioner Walker offered the substitute resolution, which was unanimously adopted.

The statement is made that the Commission's Bureau of Accounting and Rates and Tariffs will handle most of the work of the investigation, under the supervision of the committee. All of the book values of the companies will be listed, deductions made for depreciation and additions made for "going concern" value and working capital. If the net return is shown to be more than 7 per cent, conferences will be held between the commissioners and the utility companies for a determination of the reasonableness of the rates.

Adoption of this resolution is regarded as a victory for Governor Pinchot, who has waged a ceaseless fight on the utilities, with an especially bitter onslaught recently on the West Penn Power Company and the Duquesne Light Company.

As an incident in the agitation threats were made by Mayor Edward McCloskey of Johnstown and the borough officials of Punxsutawney to shut off the street lights unless rates to the cities were reduced. Johnstown's Mayor has also negotiated for a reduction of the candlepower of street lights from 1,500 to 600. In Sayre, an important North Tier town, the borough Council threatened to shut off the lights on April 20 unless the electric light company agrees to a two-year contract instead of a five-year contract.

A body known as the Pennsylvania Fair Rate Association has prepared a confidential questionnaire to be sent to every candidate for state office to determine his views on utility laws and rates.

▼

President Owens Tells of N.E.L.A. Convention

"This year's convention will differ from others in that it will be more than ever an electrical industry convention. In former years it has been the custom to have on the program a considerable number of speakers of national and international authority in their special fields, but this year the program committee feels that the greatest good will be accomplished by devoting most of our time to men within, and intimately familiar with, the problems of the industry, who will have specific messages of particular and immediate importance in this period of our history. However, lest we become too introspective regarding our own affairs, the program will be leavened by three or four addresses delivered by outstanding men in other fields, who will have something to tell us of real importance."

In these words President J. F. Owens epitomizes the spirit which lies beneath the plans now being actively formulated for the Atlantic City convention of the National Electric Light Association to be held in the week of June 6. He goes on to speak in an optimistic vein of the outlook for the manufacturers' exhibition.

Charles L. Edgar Dies Suddenly at Atlantic City

As the ELECTRICAL WORLD closes its forms word reaches it of the death at Atlantic City at 3.45 a.m. Thursday of Charles L. Edgar, president and general manager of the Edison Electric Illuminating Company of Boston and one of the most prominent figures in the electric light and power industry of the United States. Mr. Edgar, who succumbed to pneumonia, from which he suffered for four days, had gone to the New Jersey resort with his wife for the benefit of his health. He was 72 years old and one of the few remaining men who took the lead, under Edison, in starting the industry on its career of revolution. He had been president of the Boston company for 30 years and was everywhere regarded as the "dean" of the industry in New England. He was elected president of the N.E.L.A. in 1903.

▼

Governor Pinchot Outlines "Common-Sense Regulation"

Governor Pinchot of Pennsylvania in a series of speeches last week advocated what he termed "common-sense utility regulation in Pennsylvania" by proposing the following amendments to the Public Service Commission law:

1. An amendment prohibiting schedules which increase rates to go into effect until after they have been approved by the Public Service Commission.
2. An amendment permitting a munici-

▼

GLACIER A MILE UP IS SOURCE OF POWER IN EUROPE

—Underwood & Underwood

Five thousand six hundred and seventy feet above sea level, the Silvretta glacier in the Austrian Alps has become the site of a hydro station from which southern Germany, Austria and Switzerland are served. The dam, shown here, is 1,280 ft. long.

pality or any lawfully constituted district to condemn, purchase and operate any public utility in the municipality or district.

3. An amendment requiring that in a rate case where a municipality is involved all expenses be paid for by the utility or utilities involved.

4. The appropriation thus saved to the state to be used in part for engineers to assist municipalities in valuations and rural developments.

5. An amendment to prohibit the issuance of securities by public utilities until after the securities have been approved by the commission.

6. An amendment limiting the life of charters and franchises of public utilities to 50 years, as in the federal water-power act.

7. An amendment which will as far as possible, without violating the United States Constitution, give the commission jurisdiction over affiliated interests and holding companies operating utilities in Pennsylvania.

8. An amendment on rural electrification to empower a group of people in a rural community to build and operate their own distribution lines and require the utility to sell them service at a central switchboard.

Activity Marks Time for Politicians

NOTHING hopeful has happened this week and little that is cheering is likely to happen while Washington events remuddy already turbid waters.

Poorly disguised inflationary hypodermics offered as bonus propaganda come from clerics, economists, politicians and veterans.

Stock and bond markets slump wildly. Car loadings drop 16,157 in a week. Failures increase. Energy production off again.

It would appear that another crisis approaches in the economic illness of the world.

Most hopeful factor is the knowledge that we lag about one year behind England and that she is today doing far better than any one might have anticipated.

Liquidation, it appears, will run its curative course.

"Liberal" Commissioners and Advisers Meet

Deliberations have some features of a star chamber — Policy committee report fails of adoption — Holding companies attacked.

CONTRARY to what might have been inferred from the preliminary announcement issued through Morris Llewellyn Cooke, a trustee of the New York State Power Authority, about six weeks ago (ELECTRICAL WORLD, February 27, page 384), the gathering sponsored by twelve "leading exponents of public utility regulation" denominated as "liberal" which was held in New York on Friday and Saturday of last week was not open to the public, nor were representatives of the press admitted to the "round-table" discussions. The promoters of the meeting supplied the press with abstracts of the prepared speeches. About one hundred men attended, including Frank R. McNinch and Ralph B. Williamson of the Federal Power Commission, Chairman Milo R. Maltbie of the New York Public Service Commission, Chairman Henry C. Attwill of the Massachusetts Department of Public Utilities, D. E. Lilienthal of the Wisconsin commission, F. P. Gruenberg of the Pennsylvania commission, Thomas Tatum of the South Carolina commission, Amos Pinchot and Stephen Raushenbush, well-known exponents of radicalism in utility matters; several university professors who have investigated utility regulation and a number of consultants specializing in this field.

All is not harmonious

The most interesting point of the meeting was reached on the second day when the policy committee of the conference, headed by Chairman Frank P. Walsh of the New York State Power Authority, submitted its report, which declared that utility regulation had failed to protect the investor in utility securities, failed to obtain rate reductions for the consumer and failed to safeguard the credit of the utility companies themselves.

Mr. Maltbie at once offered for inclusion in the report a statement that "in the preparation and presentation of this report the members of the regulatory bodies, state and federal, and the members of their staffs took no part, as they did not consider that any action relating thereto would be proper." Prof. William Z. Ripley of the department of economics at Harvard told the pressmen waiting for "releases" that he too disapproved of the report, which was, in his opinion, too strong in some respects and not strong enough in others.

A motion to lay the report on the table was lost. A motion to receive it without approving it was carried with one dissentient. The recommendations contained in the report follow:

Revision of the present uniform classification of accounts to serve as a guide in establishing the equities of the various rates as well as of total earnings.

Development and adoption of a technique of regulation in accordance with which public service commissions will operate as effective administrative bodies charged with safeguarding the public interest. This will include provision for the initiation by the commissions of rate changes and other constructive steps in the interest of consumers on the basis of aggressive fact finding.

Establishment by law of the prudent investment principle of valuation as the public policy of the nation and the states for purposes of rate control.

Rate determination on the basis of actual cost of each class of service, including a fair profit on the capital required for such service.

Federal incorporation of holding companies with adequate control over their security issues and requirement of uniform accounting and periodic disclosure of their financial operations.

Withdrawal of the powers of the lower federal courts to review and nullify the decisions of state public service commissions, leaving the protection of constitutional rights to the state courts and, ultimately, to the United States Supreme Court.

The extracts from speeches given out for publication were in general criticisms of alleged utility policies, "irrational consolidation, overcapitalization and uncontrolled service charges" coming in for especial condemnation. By "service charges" was meant, Prof. James C. Bonbright of Columbia University, who is secretary of the New York Power Authority, explained, "the prevailing system of service contracts, which permits the executives of the parent concern to dictate the prices at which the subsidiaries shall buy services from the holding company, and, therefore, from themselves." Professor Bonbright added: "The evil should not be temporized with or merely mitigated. It should be cut out, root and branch. The profit-making service charge must go." He commended the Commonwealth & Southern Corporation for abolishing this charge.

"Holding-company breakdown"

Professor Bonbright made this attack in the course of an examination of what he called "the breakdown of the public utility holding company." He conceded that holding companies had formerly performed good service, but declared:

Today the holding companies are the financial weak sisters, their common stocks going begging on the market for a paltry few dollars per share, even their notes and debentures selling at discounts. In some cases holding companies have been leaning on their subsidiaries by borrowing from them on their unsecured notes. Fair-weather financing has characterized nearly all holding companies. Now comes foul weather and they are in trouble.

Professor Ripley led a discussion on regulation, asserting that both the United States and separate states have rightful jurisdiction over public utilities, each according to underlying economic facts which establish their respective duties.

Former Commissioner Harold Evans of Pennsylvania, discussing valuation,

advocated the abolition of commission appraisals and the ascertainment instead of "(1) the proper capitalization of the utility; (2) the proper allowance for depreciation, operating and other expenses under efficient and economical management, and (3) the return necessary to maintain its credit and attract necessary new capital."

Mr. Cooke, addressing himself to domestic electric service, said:

"My own studies lead me to believe that the cost of distribution is just about twice what it should be. The question in my mind is what part of this seeming overcharge of between $400,000,000 and $500,000,000 a year can be recovered through regulation."

Mr. Lilienthal criticised delay of regulatory bodies in handling rate cases and discussed the advisability of having people's counsel appear before regulatory commissions. Raymond B. Keech, who occupies such a position before the District of Columbia Public Service Commission, described his functions.

▼

Los Angeles G. & E. Loses Plea Against Gas Rate Cut

A statutory court of three federal judges has refused a permanent injunction to the Los Angeles Gas & Electric Corporation against a cut of $1,300,000 yearly in its rates for natural gas ordered by the California Railroad Commission to take effect on January 1, 1931, but since then suspended because of an interlocutory court decree. The decision would force the company to reduce its common-stock dividend in order to reimburse customers, protected by a reserve of 89 cents a share.

Commission Bill Made Law in South Carolina

Governor Ibra C. Blackwood of South Carolina has signed the bill giving the State Railroad Commission full regulatory authority over electric power companies and their rates. Plants owned by municipalities within their incorporated limits are exempt from regulation, but their extensions without these limits are to be under the control of the commission. This bill was passed by the two houses following the report of the South Carolina power rate investigating committee, authorized at the 1931 session of the General Assembly.

Detailed machinery is set up to allow readjustment and control of rates, and readjustments can be made either on complaints or by the commission on its own motion. Discrimination and preferential contracts are forbidden. Companies are permitted to file new schedules, which the commission may or may not allow after hearings. On failure of the commission to act within a reasonable time the companies may put proposed schedules into effect after securities have been filed with the commission to insure a refund if any increases are disallowed by it.

The issuance and sale of securities by the utilities is put under commission jurisdiction and powers of supervision are given it. Sale of a utility's securities by its employees is forbidden during their working hours, and companies must not compel employees to buy such securities. The commission will regulate the manner in which the accounts and records of the utility companies shall be kept and will have control over fees for management and engineering exacted by holding companies. Also written into the bill is a provision for indeterminate franchises, which will allow an electrical utility to operate as long as it gives satisfactory service.

▼

Mississippi Public Plants Not Included in Sales Tax

A 2 per cent sales tax passed by the Mississippi Senate and now before the House includes sale of electrical energy by public utilities but not by municipalities. An effort by Senator Robinson to cut out the section which exempts municipal waterworks, electric light plants and other utilities owned by municipalities failed. He contended that, since the consumer will pay the tax, it is not right to force the tax on utility users in Jackson and other cities where plants are owned by corporations and exempt customers of city-owned plants.

Senator Kyle opposed the amendment, declaring that "if this theory is adopted, then the city treasurer of these cities must send to Jackson 2 per cent of the sales every month," which he thought was "not common sense."

▼

Intercompany Contention Continues in St. Louis

Following a decision of the Missouri Public Service Commission, handed down last week, which rejected the application of the Union Electric Light & Power Company of St. Louis for permission to acquire 26 per cent of the stock of the Laclede Power & Light Company, thus obtaining one director on the board, Louis H. Egan, president of the Union company, on April 7 filed two suits in the St. Louis Circuit Court, one asking that the court appoint a receiver for the stock of the Laclede Power & Light Company now deposited with the Mercantile-Commerce Bank & Trust Company of St. Louis under a voting-trust agreement and the other asking that the court order the voting trustees to recognize Mr. Egan's election as a member of the Laclede company's board of directors at a meeting of voting-trust certificate holders held March 17.

The city of St. Louis joined the Laclede company in opposing the Union Electric's application for permission to acquire the certificates. In rejecting the application the commission said: "There is no doubt in our minds that the harmonious and efficient conduct of the business of both corporations here in question would be hampered and impaired by the intrusion into the board of directors of the Laclede company of a director acting in the interest of its rival."

▼

SPEED, ECONOMY, NOISELESSNESS MET ON THIS JOB

A 100-ton all-arc-welded steel building, with 30-ft. overhang for trucks, built in Los Angeles in 21 days by the Soule Steel Company for the Pacific Freight Lines, employed General Electric equipment. Absence of rivet holes made it possible to use lighter steel and yet get a more rigid building. Welding was found to be 10 to 15 per cent cheaper than other methods.

Georgia Power & Light Inquiry Is Concluded

Continuing its examination of the Georgia Power & Light Company, an operating subsidiary in the Middle West Utilities group (ELECTRICAL WORLD, April 9, page 635), the Federal Trade Commission on April 6 heard testimony relative to its earnings, investments and balance-sheet accounts.

Aaron J. Hughes, examiner, criticised the purchase of the Waycross Ice & Cold Storage Company in 1925 by the National Public Service Corporation (then a Fitkin company) as having involved a price ($280,000) "far in excess of the real value." Eventually the property was turned over to the Georgia Power & Light at $40,000, par value of its stock. Another item of testimony was that in 1930 there was a net loss of $2,707 on sales of appliances reaching $95,252.

Judson C. Dickerman, engineer-examiner, took up affairs in the allied and interconnected Florida Power Corporation, which he called "one link in a considerable chain of property-owning and stockholding corporations in which stock holdings are greatly pyramided." He told, on the following day, of the injurious effects of the collapse of the Florida boom. This was in the days of Fitkin control. "Substantially $3,800,000, or nearly 15 per cent, in the fixed capital as of December 31, 1930, can be identified as representing property no longer useful or in existence, write-ups of intangible values and write-ups reflecting boom conditions," the examiner stated.

Regarding the Georgia Power & Light Company Mr. Dickerman testified that the generating plants of the company are "relatively small, somewhat old, of indifferent quality and inadequate to support the system economically or even electrically without outside supply." Outside supply of energy, largely from the Florida Power Corporation, the examiner said, "is from sources fully adequate to meet the demands of the system."

Adjournment was taken until April 14, when H. C. Spurr, editor *Public Utilities Fortnightly*, and M. A. Brown of Boston will testify.

▼

Pennsylvania Railroad Asks Loan of $55,000,000

Work on the electrification of the Pennsylvania Railroad between New York and Washington will be halted unless the railroad obtains a loan of $55,000,000 from the Reconstruction Finance Corporation, S. J. County, vice-president of the Pennsylvania, said in a recent letter to Eugene Meyer, chairman of the corporation board.

The railroad applied for the loan early last month, asserting that it planned to spend $68,000,000 this year on the electrification project, but would furnish the difference itself. Originally the railroad planned to spend more than $124,000,000 in 1932.

▼

World Power Conference to Meet in Scandinavia

Denmark, Sweden and Norway will participate in a sectional meeting of the World Power Conference next year, which will open at Copenhagen on Monday, June 26, with technical sessions at Stockholm from June 28 to July 4 inclusive and further proceedings in Norway from July 7 to the closing session at Oslo on July 10. The technical program will be devoted primarily to the power problems of "heavy" industry and of sea and land transport. Visits to plants and developments in all three countries and in Finland will be made.

This announcement is contained in the annual report of O. C. Merrill, chairman of the American Committee, World Power Conference, who also says that chemical engineering interests have expressed the desire to hold in London in 1934 or 1935 under the auspices of the World Power Conference a sectional meeting on the chemical industries, which would be financed by these interests.

▼

Central France to Have Two Large Hydro Plants

Water-power plants which are being constructed by the Société des Forces Motrices de la Truyère at Brommat and Sarrans, in the center tableland of France, have been designed to fulfill a threefold purpose—first, to exploit an important source of energy; second, to link up with other centers of production in the north, south and east; third, to provide power storage on a large scale.

The Brommat plant, which is to take the base load, utilizes a head of 850 ft. and is to have a capacity of 180,000 kva., while a dam at Sarrans will make possible a peak-load station capable of taking an additional load of 120,000 kva.

Flexibility is enhanced by the fact that the water used by the turbines in the Sarrans station for the three hours during which this plant has to carry the peak load is collected in a basin at the foot of the Sarrans dam, from where it is led to the turbines in the Brommat plant. The effect of the great storage capacity of the Sarrans reservoir, which will compensate for the reduced volume of river water in the summer, will later be amplified by the interconnection of the power stations on the River Truyère with Alpine valley hydro-power plants.

The lines radiating from the Truyère hydro plants will carry power at 220 kv. in the direction of Eguzon, Paris and Orleans, as well as to Lyons, St. Etienne, Monistrol and Saumur, while the lines to Clermont-Ferrand and Marseilles will transit power at a pressure of 150 kv. The Brommat station is to be ready in the fall, but the Sarrans station not until 1935.

Coming Meetings

Northwest Electric Light and Power Association — Accounting Section, Davenport Hotel, Spokane, Wash., April 18-19; W. F. Miller, Washington Water Power Company, Spokane.

Southeastern Division, N.E.L.A.—Conference, Atlanta, April 21 and 22. C. M. Kilian, 508 Haas-Howell Bldg., Atlanta.

Electrochemical Society — Lord Baltimore Hotel, Baltimore, April 21-23. C. G. Fink, Columbia University, New York.

Southwestern Division, N.E.L.A. — Arlington Hotel, Hot Springs, Ark., April 26 and 27. S. J. Ballinger, San Antonio Public Service Co., San Antonio.

American Welding Society—New York, April 27-29. M. Kelly, 29 West 39th St., New York.

Missouri Association of Public Utilities—Excelsior Springs, Mo., April 28-30. Jesse Blythe, 103 West High St., Jefferson City, Mo.

American Institute of Electrical Engineers—District meeting, Providence, May 4-7; summer convention, Cleveland, June 20-24. Acting secretary, 33 West 39th St., New York.

National Electrical Manufacturers' Association—Hot Springs, Va., May 15-20. A. W. Berresford, 420 Lexington Ave., New York.

Middle West Division, N.E.L.A. — Muehlebach Hotel, Kansas City, Mo., May 18-20. Thorne Browne, 1527 Sharp Bldg., Lincoln, Neb.

East Central Division, N.E.L.A.—Commodore Perry Hotel, Toledo, Ohio, May 24-27. D. L. Gaskill, 603 Broadway, Greenville, Ohio.

National Electric Light Association — Atlantic City, N. J., June 6-10. A. J. Marshall, 420 Lexington Ave., New York.

Pacific Coast Electrical Association—Hotel Huntington, Pasadena, Calif. June 14-17. K. I. Dazey, 447 Sutter St., San Francisco.

Canadian Electrical Association—Manor Richelieu, Murray Bay, Que., June 15-17. B. C. Fairchild, 409 Power Bldg., Montreal.

New England Division, N.E.L.A.—Mount Washington Hotel, Bretton Woods, N. H., July 11-13. Miss O. A. Bursiel, 20 Providence St., Boston.

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Compromise Rates for Indianapolis Are Approved

The agitation for lower electric rates in Indianapolis has led to the approval by the Indiana Public Service Commission of a compromise which the Indianapolis Power & Light Company has accepted. The company's revenues will be reduced by $164,985 annually, including a saving to the city government of $67,813. The new schedule for electric lighting provides a rate of 6¼ cents per kilowatt-hour for the first 50 kw.-hr. used monthly. The former rate was 6½ cents. The municipal charges, excluding traffic lights, were cut 15 per cent.

Utility Stocks Recede Further

Pressure on public utility stocks remained persistent, several prominent issues losing considerable ground. The "Electrical World" index of 50 representative stocks declined to 24.8, as compared with 28.2 during the preceding week. Losses were recorded by Detroit Edison, Edison of Boston, Public Service of Northern Illinois and United Gas Improvement.

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U.G.I. Earning Power Is Unimpaired

The fiftieth annual report of the United Gas Improvement Company shows that this long-established utility holding company has come through a trying year with earning power scarcely impaired. Operating revenues of utility subsidiaries amounted to $105,682,308, compared with $108,265,879 for 1930, but notwithstanding this decrease the balance of these subsidiaries' earnings applicable to U.G.I. increased from $25,828,606 to $26,009,057, a result due in large measure to a decrease in operating expenses of $2,230,241. Total earnings applicable to U.G.I. preferred and common stocks were $37,722,774, a decrease of $693,138 from 1930. Per share earnings were $1.46 for 1931, a decrease of 5.3 per cent from 1930, which were $1.54 per share.

The consolidated balance sheet as of the end of the year shows property and plant of $630,762,909 and other investments of $137,815,897. The current assets were $52,066,139, of which $20,150,590 was cash, against which there were current liabilities of $11,493,503. Subsidiaries of the company had funded debt of $247,444,600 outstanding and loans of $3,025,000, the company itself having no bond obligations or bank loans. The balance sheet shows reserves have been set up to the amount of $66,260,537.

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German Holding Company Cuts Dividend

A sharp cut to 4 per cent in the dividend of Gesellschaft für Elektrische Unternehmungen (Corporation for Electrical Enterprises) has been announced. The company will make the 4 per cent disbursement on 100,000,000 reichsmarks of capital for the year 1931. This compares with a dividend disbursement of 10 per cent in the preceding year. Dividends are declared in April for the previous year.

Gesfurel, as the corporation is generally known, is classed among the leading factors in the development of the electric power and light business in Germany and in Europe generally. Through engineering and management contracts and through its own extensive investments it is identified with electric properties not only in Germany but also in France, Turkey, Portugal, Hungary, Rumania, Jugoslavia, Czechoslovakia, Poland, South America and Spain.

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Insull Readjustments Make Progress Slowly

Negotiations between Samuel Insull and New York and Chicago bankers regarding the status of the Middle West Utilities Company are reported as little changed. Financial commentators anticipate the early appointment of a reorganization committee, but official confirmation is lacking. It is understood that so far Mr. Insull has presented no definite plan for Middle West to the bankers. Early this week it was announced that the business of the Utility Securities Company, stock-distributing organization of the Insull utility system, would be closed out and a new company formed. The official announcement stated:

A new Utilities Securities Company will be shortly put into operation as the securities distributing organization for the Commonwealth Edison Company, Public Service Company of Northern Illinois and the People's Gas Light & Coke Company.

The new company will be identical with the old as to facilities and personnel. Liquidation of the old company will be undertaken simultaneously with the formation of the new company. All indebtedness will be liquidated in an orderly manner.

The new company will, therefore, be enabled to start with neither bank loans nor brokerage loans and will be entirely free

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Current Earnings Reports of Electric Light and Power Companies

OPERATING COMPANIES

	1932	1931	Per Cent Increase	Operating Ratio 1932	Operating Ratio 1931
Florida Power & Light (Year ended January 31)					
Gross earnings	$11,553,272	$11,632,142	— 1.0	50	52
Net earnings	5,796,426	5,622,726	3.0	..	..
Kansas City Power & Light (Year ended February 29)					
Gross earnings	14,678,054	14,793,742	— 0.8	44	45
Net earnings	8,286,421	8,169,791	1.4	..	..
Nevada-California Electric (Year ended February 29)					
Gross earnings	5,641,558	5,691,671	— 0.9	48	48
Net earnings	2,918,952	2,980,720	— 2.1	..	..
Southern California Edison (Year ended February 29)					
Gross earnings	40,336,358	41,160,907	— 2.0	33	32
Net earnings	27,019,762	28,187,673	— 4.0	..	..

HOLDING COMPANIES

	1932	1931	Per Cent Increase	Operating Ratio 1932	Operating Ratio 1931
Associated Gas & Electric System (Year ended January 31)					
Gross earnings	$104,590,030	$104,531,992	0.0	53	54
Net earnings	48,703,946	48,182,877	1.0	..	..
Commonwealth & Southern & subs. (Year ended February 29)					
Gross earnings	128,313,161	139,378,347	— 7.9	46	48
Net earnings	69,285,751	71,732,614	— 3.4	..	..
Public Service Corp. of New Jersey & subs.* (Year ended February 29)					
Gross earnings	135,808,427	138,547,525	— 1.9	67	68
Net earnings	45,386,539	44,162,398	2.8	..	..

* Operating expenses include depreciation.

from debt. There will be a new paid-in capital of $500,000.

The partial-payment purchase plan which was so widely popularized by the former concern will be carried on by the new company.

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Receiver Asked for United Public Service

Upon a stockholders' application for receiver, charging insolvency, the United Public Service Corporation, a Middle West subholding company, has been given until April 18 by New Jersey authorities to show why one should not be appointed. Interest on United Public Service bonds was defaulted on April 1, and interest on several of its subsidiaries was defaulted the same day.

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Where Is the Control of Bond & Share?

According to figures compiled as of the end of March the executive officers and directors of the Electric Bond & Share Company were registered holders of but one-fifth of 1 per cent of the outstanding common shares of this organization.

Wall Street comment this week was varied, but it was pointed out that the former large holdings may still be held by the officers and directors though registered through nominees.

Common stock so held totaled 10,592 shares out of 4,965,489 outstanding, allowing for the three-to-one reverse split recently made. Reports as published showed that Sidney Z. Mitchell, chairman of the board, had 8,800 shares credited to his name; Erwin G. Merrill, a director, 707; W. C. Lang, comptroller, 439; Frederick A. Farrar, director, 385; George H. Howard, director, 215; William C. Potter, director, 36; E. K. Hall, director, 7; Lewis E. Pierson, director, 2⅓ shares common and 100 preferred.

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Increased Corporation Tax Brings Protest in Canada

An increase from 10 to 11 per cent in the corporation tax rate in Canada, as announced in the federal government's budget, has drawn protests from private power interests. Commenting on the measure, J. S. Norris, vice-president and managing director of Montreal Light, Heat & Power Consolidated, said it was to be deplored that an attempt was not made to equalize the burden of taxation throughout the country instead of increasing the rate of the discriminatory corporation income tax by means of which customers of privately owned utilities are mulcted for the benefit of publicly owned utility customers.

The people of Quebec in general, Mr. Norris said, and the citizens of Montreal in particular, have a genuine grievance which must be remedied before it grows intolerable. He pointed out that with the increases now put into effect the consumers of electricity and gas in Montreal will pay an amount of $1,155,561 for the year 1931, as the tax is retroactive. The amount paid in 1930 was $1,000,508. "Yet no such levy is made upon similar consumers in Ontario and elsewhere where publicly owned utilities operate," he complained.

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New York Metal Prices

	April 6, 1932 Cents per Pound	April 13, 1932 Cents per Pound
Copper, electrolytic	5.75-5.85	5.75
Lead, Am. S. & R. price	3.00	3.00
Antimony	6.00	6.00
Nickel, ingot	35.00	35.00
Zinc, spots	3.15	3.15
Tin, Straits	19.15	18.40
Aluminum, 99 per cent.	23.30	23.30

Niagara Hudson Owners Reduce Outstanding Shares

Stockholders of the Niagara Hudson Power Corporation at a meeting held April 12 approved the reduction in capitalization, details of which were outlined in the March 5 issue of the ELECTRICAL WORLD. Floyd L. Carlisle, chairman of the board, said that unless conditions changed radically for the worse, he could see no reason why the company should not pay the regular dividend for this year. Concerning the $25,000,000 bank loans at the end of 1931, he added that it was proposed to pay them off through the sale of bonds of the operating companies. The construction budget for 1932 amounts to $19,000,000.

The principal stockholders of Niagara Hudson Power Corporation at the present time are:

Holder	Shares Owned
Aluminum Company	2,713,492
Niagara Share Corp. and Schoellkopfs	3,500,000
Mohawk Valley Securities Corporation	892,523
Niagara, Lockport & Ontario Power Co.	74,646
Bonbright & Company	157,600
Power & Electric Securities Corporation	624,425
United Corp. and St. Regis Paper Co.	5,729,250
United Gas Improvement Company	1,930,320

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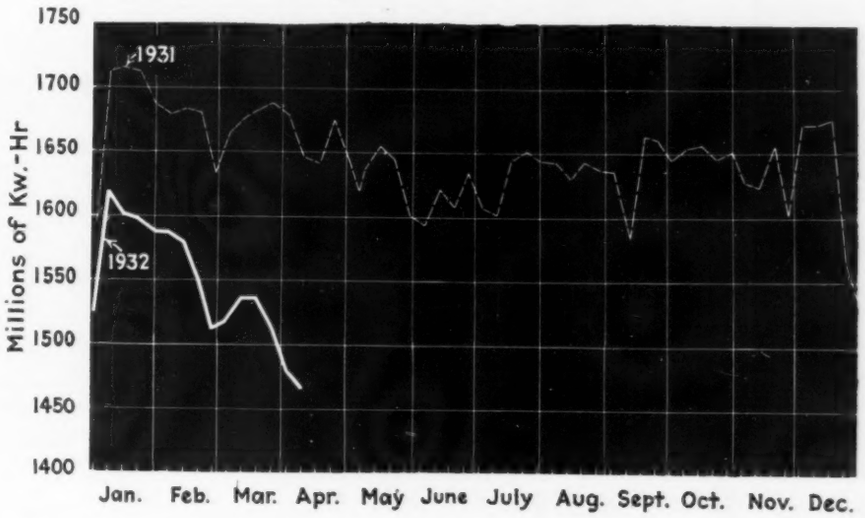
Output 11 per Cent Under 1931



AT THIS season of the year electrical energy consumption usually decreases gradually from week to week as the days lengthen. Under normal conditions it is, however, larger than in the corresponding period of the preceding year. The decline of 1 per cent in the week ended April 9, compared with the output of the week of April 2, indicated by the estimates published by the National Electric Light Association is not abnormal; it is in fact smaller than last year. But the continued low level, still down 11.1 per cent from 1931, shows that industrial operations are not picking up as they should.

Regional percentages for recent weeks reveal an appreciable improvement in the Chicago area and on the Pacific Coast, smaller gains elsewhere, but a relative decline in New England.

Weekly Output, Millions of Kw.-Hr.

	1932	1931	1930	1929
April 9	1,465	1,647	1,715	1,697
April 2	1,480	1,680	1,708	1,663
March 26	1,515	1,689	1,723	1,680
March 19	1,538	1,682	1,722	1,683
March 12	1,538	1,676	1,736	1,687

Per Cent Change from 1931

Region	Week Ended April 9	April 2	March 26
Atlantic seaboard	— 5.6	— 6.6	— 4.7
New England alone	— 8.5	— 6.6	— 4.3
Central industrial	—14.8	—15.7	—13.9
Chicago district	— 8.8	—12.6	— 9.8
Pacific coast	—13.8	—15.2	—16.6
United States	—11.1	—11.9	—10.3

Electrical Exposition to Be Held in Portugal

The "Ia Exposicao Internacional da Luz e do Som" (First International Exposition of Light and Sound) will be held at Oporto from May 1 to 15, 1932, and all branches of the electrical industry will be represented, including household equipment, industrial equipment, therapeutic appliances, radio and motion-picture apparatus, signaling equipment, neon gas signs, etc.

All manufacturers, domestic and foreign, and their agents and dealers in electrical apparatus are eligible to exhibit their products. Space on the main floor will be rented for from 15 to 30 escudos ($0.51 to $1.02) per square meter, plus a supplementary charge of 30 per cent. The committee in charge of the exposition promises to co-operate with exhibitors in obtaining permission from the customs for temporary entry without payment of duty of all foreign equipment exhibited.

The Department of Commerce reports that further information may be obtained from the Comissao Organizadora da Exposicao Internacional da Luz e do Som, Cancela Velha 39, Oporto, Portugal.

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High-Pressure Boilers Ordered for Russia

Two Loeffler boilers with a normal capacity of 285,000 lb. of steam per hour at a pressure of 1,900 lb. per square inch and with a total temperature of 932 deg. F. have been ordered for the Moscow generating station in Russia and apparently mark the acceptance by U.S.S.R. officials of yet another recent engineering innovation. Provisions are made for the burning of locally mined coal of low B.t.u. content. The coal will be pulverized and mixed with air at 485 deg. F. The double furnace chamber is of 21,000 cu.ft. capacity, while the radiant superheater has a superficial area of 3,120 sq.ft. Resuperheaters of the convection type will raise the temperature from 735 deg. to 932 deg. F. Reheaters, economizers and air heaters will be used.

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Westinghouse Rectifiers for New York Subway

Award has been made to the Westinghouse Electric & Manufacturing Company by the Board of Transportation of New York City of a contract for furnishing the electrical power equipment for the new Fulton Street subway in Brooklyn. The award was made at the bid price of $1,290,860.

The contract calls for nine mercury-arc rectifiers to be installed along the line of the new subway for the purpose of transforming alternating current into direct current for power for the third rail of the subway. The award of the contract will be brought to the attention of the Board of Estimate and Apportionment at the next meeting of the committee of the whole for the necessary appropriation of funds.

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Exports of Electrical Equipment (Preliminary)

Article	February 1931	February 1932
Generators:		
Direct current—		
Under 500 kw.	$36,350	$3,904
500 kw. and over	.....	.....
Alternating current—		
Under 2,000 kva.	6,203	33,541
2,000 kva. and over	38,910	.....
Steam turbine generator sets	162	49,572
Accessories and parts for generators	6,275	42,612
Arc welding sets	34,089	41,789
Self-contained lighting outfits	39,065	7,530
Batteries:		
6 and 12 volt storage batteries	128,009	97,774
Other storage batteries	66,116	34,337
No. 6 dry cell batteries	38,658	12,100
Flashlight batteries	174,265	126,621
Radio B and C batteries (dry)	20,044	19,670
Other dry and wet cell primary batteries	15,436	8,294
Transforming or converting apparatus:		
Power transformers over 500 kva.	52,904	402,126
Distribution transformers, 500 kva. and less	86,930	13,126
Instrument transformers	14,260	3,230
Other transformers	32,230	26,821
Complete battery chargers, non-rotating	5,384	2,513
Double-current and motor generators, dynamotors, synchronous and other converters	83,305	27,693
Transmission and distribution apparatus:		
Switchboard panels, except telephone	340,601	27,286
Power switches and circuit breakers over 10 amp.	95,257	46,579
Fuses	17,502	6,718
Watt-hour and other measuring meters	46,477	39,305
Electrical indicating instruments	44,233	16,890
Electrical recording instruments	18,503	26,186
Other electrical testing apparatus	49,405	43,976
Lightning arresters, choke coils, reactors, and parts	44,747	18,004
Motors, starters and controllers:		
Motors, ¼ hp. and under	$129,082	$73,814
Motors, over ¼ and under 1 hp.	30,333	14,089
Stationary motors —		
1 to 200 hp.	153,792	68,193
Over 200 hp.	90,538	2,300
Railway motors	13,585	3,491
Electric locomotives —		
Railway	19,427	.....
Mining and industrial	24,921	3,972
Station and warehouse electric motor trucks	14,706	293
Starting and controlling equipment —		
For industrial motors	100,457	45,759
For electric railway and vehicle motors	7,841	4,478
Portable electric tools	82,661	26,758
Accessories and parts for motors	118,530	87,455
Electric refrigerators and parts:		
Household	535,200	338,553
Commercial up to 1 ton	96,015	173,803
Parts for electric refrigerators	175,922	266,283
Electric appliances:		
Flashlight cases	52,689	18,359
Electric fans	41,961	41,142
Electromechanical health exercisers	4,326	950
Electric incandescent light bulbs — For automobiles, flashlights, and Christmas trees	15,692	12,876
Other metal filament bulbs	39,356	44,584
Other electric lamp bulbs	6,343	3,443
Searchlights and floodlights	21,115	.....
Searchlights and airport beacons	.....	33,276
Floodlights	.....	3,504
Electric household washing machines	50,922	35,574
Electric domestic vacuum cleaners	85,174	30,925
Other domestic motor-driven devices, except tools	26,725	16,908
Electric flatirons	24,962	16,676
Electric cooking ranges	50,862	21,893
Other domestic heating and cooking devices	60,774	19,952
Industrial electric furnaces, ovens, and other heating devices	39,742	24,628
Therapeutic and X-ray apparatus	96,442	79,398
Signal and communication devices:		
Radio apparatus—		
Transmitting sets, tubes and parts	$46,425	$63,162
Receiving sets	934,376	523,781
Radio receiving tubes	135,872	160,606
Receiving-set components	211,100	177,820
Loudspeakers	63,812	33,051
Other receiving-set accessories	59,692	22,182
Telegraph apparatus	23,381	14,804
Telephone apparatus—		
Telephone instruments	18,069	8,453
Telephone switchboards	3,597	68
Other telephone equipment	218,962	54,386
Bells, buzzers, annunciators and alarms	18,457	35,771
Other electric apparatus:		
Starting, lighting and ignition equipment	38,545	55,121
Insulating material	50,004	19,896
Metal conduit, outlet, and switch boxes	52,297	28,026
Sockets, outlets, fuse blocks and lighting switches	120,551	70,820
Electric interior lighting fixtures	143,583	36,134
Electric exterior lighting fixtures	45,690	20,298
Other wiring supplies and line material	70,168	60,568
Other electrical apparatus, n.e.s.	428,333	269,807
Rubber and friction tape	29,418	13,389
Globes and shades for lighting fixtures	27,567	19,179
Glass electric insulators	9,875	4,442
Electrical porcelain:		
For less than 6,600 volts	13,842	10,758
For 6,600 volts and over	54,436	15,163
Carbons and electrodes:		
Electrodes for electric furnaces	122,690	101,371
Other carbon products	32,049	.....
Carbon brushes and stock	.....	7,869
Other carbon products	.....	25,475
Insulated iron or steel wire and cable	9,317	2,162
Copper, bare wire	76,175	15,155
Insulated copper wire and cable:		
Rubber-covered wire	52,820	52,651
Weatherproof wire	14,345	36,000
Telephone cable	13,354	862
Other insulated copper wire	300,482	36,320
Nickel-chrome electric resistance wire	13,720	12,487
Electric clocks	.....	7,338
Totals	$7,198,419	$4,706,901
Two months ended Feb. 29	$14,920,465	$8,816,58

Wisconsin and Alabama Have Different Rate Theories

Public utility companies should be willing to forego "normal" profits under existing abnormal conditions and to make efforts to reduce rates as general prices and incomes of customers go down, the Wisconsin Public Service Commission declared in a recent order authorizing a voluntary reduction in telephone rates at Mount Horeb, in that state. "The company deserves praise for its policy in passing along to its subscribers all operating economies that it has been able to place in effect," the order said. "In a time of widespread distress like the present the commission feels that corporations engaged in furnishing a public service should make every effort, consistent with maintaining satisfactory service, to reduce rates as general prices and the incomes of customers go down. Public utility companies under existing abnormal conditions should be willing to forego 'normal' profits."

The Mount Horeb Telephone Company is home-owned. Its officers testified that it was their belief that their subscribers are entitled to some relief, because they "have all suffered a serious loss in income as a result of the low prices received for their produce, without a corresponding decrease in the cost of living."

The Wisconsin commission order contrasts with one made by the Alabama Power Commission some weeks ago which had wide publicity. Refusing to order a reduction in Birmingham gas rates, the Southern commission pointed to "fundamental differences between public utility business and private enterprises," saying in effect that since regulation prevents inflation of utility charges during prosperous times it would be wrong to force utilities to accept unremunerative rates in times of depression or to subject them to "the sharp price fluctuations which are incident to private business."

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Burlington's New Unit Has High Pressure and Speed

Following a period of preliminary tests, the first high-pressure boiler and turbo-generator to be installed in the Public Service Electric & Gas system of New Jersey has gone into commercial operation at the Burlington generating station. The new unit employs steam at a pressure of 730 lb. and a temperature of 860 deg. F. It has a rating of 18,000 kw., bringing the total capacity of the station to 53,000 kw., and operates at 3,600 r.p.m.—a very unusual speed for a generator of that size.

The boiler, which burns pulverized coal, has a greater capacity than the combined output of the ten boilers previously installed in the station, all of which have been shut down and will be kept in reserve for emergency use. The high-pressure steam is utilized at lower pressure to operate the three other turbines in the station.

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Maryland Utility Men Hold Tenth Convention

A paper on co-operation between utilities and dealers in promoting retail sales of gas and electric appliances, by T. E. Roach of the National Electric Power Company, followed by one on "Law in the Spotlight," by Dr. W. W. Cook of Johns Hopkins University, and one on "New Tools for the New Age," by Charles M. Ripley of the General Electric Company, marked the general session of the Maryland Utilities Association when it held its tenth annual meeting at Baltimore on April 8. The electric group, under the chairmanship of C. H. Leatham, heard N. F. Lawler, commercial manager Eastern Shore Public Service Company, on sales promotion and J. S. Cruikshank, Consolidated Gas, Electric Light & Power Company, on residence metering and service entrance methods.

F. A. Mitchell was elected president, W. A. Tobias vice-president, G. P. Mangan treasurer and D. E. Kinnear re-elected secretary.

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Mississippi Supreme Court Upholds Competing Utility

Declaring that "the policy of this state is to encourage rather than discourage competition," the Mississippi Supreme Court held in a ruling just made that public utilities have the right of eminent domain and that even where one company serves a town or district, another corporation may exercise its eminent domain to construct a line into the same town or district. The ruling was made in upholding the right of the Public Service Corporation of Mississippi to lay a pipe line from Jackson to Hattiesburg, although that city is already served by another gas line running from Jackson to Mobile and tapping Hattiesburg.

"It seems that a complete answer to the contention is that the public policy of this state, as evidenced by its anti-trust statutes, is to encourage rather than discourage competition," says the ruling. "Under the law a municipality is wholly without power to grant an exclusive franchise to a public utility company. This limitation on power of municipalities also illustrates the public policy of our state that competion shall be encouraged rather than discouraged."

Major New Construction This Week

TRANSMISSION and distribution extensions to cost about $100,000 planned by Iowa Power & Light Company at Adel, Iowa, include rebuilding of existing lines for heavier voltage. A new 44,000-volt line will be built.

$1,500,000 for underground conduits and lines is planned by City Council, Baltimore, Md. Proposition before voters for ratification in conjunction with a $22,000,000 public improvement bond issue on May 2.

Motors, controls, machine drives, conveyors and other electrical equipment, estimated to cost over $40,000, needed for plant to be constructed by Freihofer Baking Company at Allentown, Pa., to replace plant recently destroyed by fire. Total cost about $500,000.

Eaton, Ohio, will spend $233,000 for building and equipment for a city-owned electric light and power plant.

Bids for 22 standard airway electric rotating beacons, with complete accessories, are being asked by the Department of Commerce, Aeronautics Branch, Washington, D. C., until April 25, for use on Dallas-Little Rock airway.

Electric machinery and auxiliary equipment, including conveyors, refrigerating equipment and auxiliaries, will be installed in the $75,000 meat-packing plant to be constructed by Swift & Company, Chicago, at Mobile, Ala.

Substation equipment, including transformers and accessories, wire and cable for feeder and distributing lines, fittings, etc., will be purchased by Iron River, Mich. A $75,000 bond issue is authorized.

New Hampshire Utilities Reply to Commission

A brief in opposition to that of the State of New Hampshire regarding the contested orders of the Public Service Commission of that state to the New Hampshire Gas & Electric and Derry Electric companies (ELECTRICAL WORLD, March 26, page 556) has been filed with the State Supreme Court by the appellants' attorneys. The commission ordered the utilities to stop borrowing money from the Associated Gas & Electric Company, which controls them, and made a number of other demands which the companies resisted.

In the brief just filed the appellants contend that the orders are beyond the commission's authority, are repugnant to the Constitution of New Hampshire and the Fourteenth Amendment and are a usurpation of judicial authority. It is further declared that no complaint has been made as to the rates of the utilities, that not more than an adequate return is being received by them, and that the subject matter of the orders is purely one of management.

I. C. C. and Jurisdiction on Radio

Refusal by the Interstate Commerce Commission to assume jurisdiction over radio broadcasting is recommended by W. M. Cheseldine, one of the commission's examiners, in reporting on the merits of a complaint filed with the commission last September by the Sta-Shine Products Company of Brooklyn, N. Y. This is the first time an attempt has been made to invoke I.C.C. jurisdiction over the charges and practices of a broadcasting company. It is expected that the commission will confirm the examiner's findings.

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New Franchise Soon in Louisville

Mayor William B. Harrison of Louisville and officials of the Louisville Gas & Electric Company have been in conference regarding a new 20-year franchise, which must be offered for sale within a year. It is expected to provide for a rate revision every five years and to embody reductions in electric rates.

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Municipal Ownership for Houston?

Because the recent financial report of the Houston Lighting & Power Company showed profits for 1931 in excess of $3,000,000 the Houston Taxpayers' Association has addressed a letter to the Mayor requesting that a citizens' committee be appointed to investigate the advisability of municipal ownership of electric and other utilities. The association also urges the city to seek a reduction of the 8 per cent return allowed the Houston Lighting & Power Company.

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Private and Public Utilities Clash

Injunctions have been obtained to prevent the city of Milwaukee from disturbing or removing conduits of the Milwaukee Electric Railway & Light Company in order to lay water mains. The city claims priority rights, but the Circuit Court held that the city was acting in a proprietary capacity as a public utility and denied that the use of some of the water for extinguishing fires and other public purposes made the city's action governmental in character. Thousands of dollars that the company may claim as damages are involved, and the case will go to the Supreme Court of the state.

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Spokane Wants Rate Inquiry

Voting to accept an invitation of the City Council of Seattle to call for a state investigation of telephone rates, the City Council of Spokane last week broadened the request to include light and power and gas rates. No great accumulation of data on light and power rates has taken place since the Washington Water Power Company valuation was completed, so far as Spokane is concerned, in 1918. At that time a schedule of light and power rates was fixed by agreement, and since then reductions have been voluntarily made by the company.

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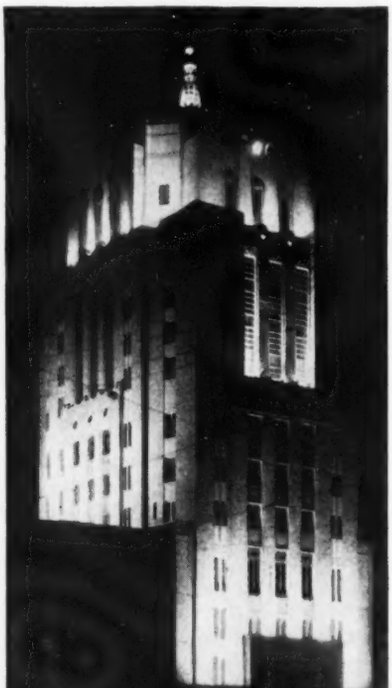
FLOODLIGHTING IN TEXAS



—Courtesy Gulf States Utilities Co.

Seventy-two floodlighting units employing a total load of 28.6 kw. make the new million-dollar court house of Beaumont, Tex., a brilliant spectacle at night. A 1,000-watt revolving air beacon surmounts the tower, and a 1,000-watt clear directional light with 2,000,000 beam-candlepower, points to the nearest airport.

▼

Wisconsin Commission Keeps Busy

Announcement of the fifth investigation of major public utilities under the new law that permits the commission, if it sees fit, to compel a utility under investigation to pay for the cost of such an inquiry was made last week by the Wisconsin Public Service Commission. The new investigation will go into the rates, service, practices and activities of the Wisconsin Public Service Corporation, serving 137 communities in the state. Other investigations announced include the Wisconsin Gas & Electric Company of Racine. Hearings in the Wisconsin Power & Light Company investigation are to be held soon.

Memphis Rates May Be Cut

Memphis Power & Light Company officials have been ordered to apear before the Tennessee State Railroad and Utilities Commission on May 3 to show why electric light rates and gas rates in Memphis should not be reduced. There is some agitation for cutting the first step of the domestic rate from 8 cents to 7 cents a kilowatt-hour on the monthly bill, the company's rate of return being thought too high.

▼

Roosevelt Signs Interstate Bill

Governor Roosevelt of New York has signed the bill to extend the life and enlarge the powers of the commission on interstate transmission of power (ELECTRICAL WORLD, February 27, page 385).

▼

Wyoming Project Approved

A favorable report on the Kendrick bill to authorize construction of the fifteen-million-dollar Casper-Alcova irrigation and power project in Wyoming has been made by the Senate irrigation committee. Profits from the sale of power, after the cost of the whole project has been paid, "shall be disposed of as Congress shall direct."

▼

Iron River Will Distribute Power

Iron River, Mich., will distribute its own electric power as the result of approval by voters of a bond issue for acquisition of a municipal system. The vote was 997 to 375. The election followed refusal of the Iron Range Light & Power Company to lower its rates. The city will buy power from the Wisconsin-Michigan Power Company.

▼

Irish to Extend Shannon Plant

Toward the end of summer the Irish Electricity Supply Board expects to begin an important extension of the plant at Ardnacrusha. In the opinion of the board the existing plant will be unable to cope with the increased demand for energy next winter, and therefore a fourth turbine will be installed. No work will be necessary on the headrace. The cost of the extension will be approximately $1,500,000.

▼

San Gabriel Dam Facilitated

Representatives of Pasadena, the Southern California Edison Company and the Los Angeles County Flood Control District have reached a tentative agreement designed to permit construction of the county's proposed flood-control dam in the San Gabriel Canyon. When ratified the agreement will give the county full jurisdiction over land and

property at the site of the proposed dam as a result of relinquishments by Pasadena and the Edison company. The district agrees on its part to reconstruct the Edison company's intake and conduit line for the Azusa hydro-electric plant, north of the dam site.

Television Limitations Enumerated by R.M.A.

In recognition of the exceedingly confused situation regarding television, its practical possibilities, present limitations and probable development, the engineering division of the Radio Manufacturers' Association has just issued a statement designed to clarify misunderstandings and misconceptions regarding this much-heralded little brother to radio.

Many problems appear which must be overcome, says the report, before television can be a satisfactory means of home entertainment. The most important of these are:

1. Greater detail should be obtained in received picture.
2. Television pick-up equipment should be portable and as easily used as present-day sound-picture pick-up equipment.
3. Transmitting systems must be evolved which will render a satisfactory and reliable service over an extensive range.
4. Receivers as single in operation as our present radio receivers must be designed and built at a reasonable cost.
5. Quiet and satisfactory illuminated picture equipment for the home must be designed and built at a reasonable cost.

Regardless of the present problems, concludes the R.M.A. statement, there has been enough work done to justify some predictions which can be conscientiously made. With the development of the new short-wave channels at frequencies higher than 35,000,000 cycles reliable transmission of television can be predicted. Ample room for an adequate number of transmitting stations can be visualized in this short-wave region. It is perfectly conceivable that a sight-and-sound service can be worked out to be received on a single receiver with a simplified tuning and control mechanism.

Hotbed Electrification Aids Plant Growth

A device perfected by engineers of the Westinghouse Electric & Manufacturing Company and exhibited for the first time at a flower show in the Cleveland Auditorium is said to control the heat for hotbeds in such manner that plants take root in half the time normally required. The device is placed in a wooden container under the hotbed where the seedlings or sprouts are planted. The electricity is turned on, and the temperature is maintained by a thermostat.

Some astonishing results, it is asserted, have been obtained by horticulturists who have experimented with the new Westinghouse device. In one case it was found that in replanting cuttings of double petunias 95 to 98 of every hundred take root when planted in electrically heated cutting benches. Under former methods an average of five out of every hundred took root. Geraniums in electrically heated benches had a good rooting system in eighteen days, although by the old method many of the slips rotted and those that did take root required about 30 days. Lettuce was found to break ground in three days. In northern Illinois the growth of tomatoes has been uniform and they were much larger in size than those in an adjacent bed without controlled temperature.

Dual-Rated Arresters Used on 220-Kv. Line

Under emergency conditions the lightning arresters now used on the 220-kv. Safe Harbor transmission line terminal at the Westport substation of the Consolidated Gas, Electric Light & Power Company in Baltimore automatically change their rating from 204 kv. to 240 kv. in less than half a second.

Such characteristics are desirable to avoid damage to the arresters under the overvoltage conditions common in applications where, owing to switching operations, arresters are left connected to hydro-electric generating units after loss of load on the latter. When the load on a waterwheel unit is suddenly dropped heavy overvoltages due to a combination of internal regulation and overspeeding occur. Such conditions may cause complete failure of the arrester unless it is applied with this hazard in view. Ordinarily this is done by using arresters with a rating sufficiently high to withstand the maximum voltage without discharge, so that the line has less protection against lightning than would have been the case had the arrester been installed for line voltage.

To this installation Westinghouse engineers have added a switch at the base of each phase, which usually short-circuits sufficient arrester units to obtain apparatus protection corresponding to a 204-kv. arrester rating. Upon the occurrence of overvoltage due to loss of load an instantaneous voltage relay trips the switch and changes the rating to 240 kv., thus making the arrester safe for the maximum expected remaining voltage.

The relay operates at 25 per cent of voltage, and the switch contacts part in less than 0.25 second and are fully open in less than 0.50 second, the transition taking place before the remaining voltage has had time to build up to 204 kv.

THIS WOULD PROBABLY HAVE INTERESTED PLANTE

—*Wide World Photos*

A storage battery which has just been completed at Kruff Laboratory, Harvard University, for use in X-ray experiments has a potential of 100,000 volts. Dr. J. C. Hudson is shown throwing one of the switches with the specially insulated pole which allows him to keep at a safe distance.

EDITORIALS

L.W.W.MORROW
Editor

A sample of "liberal" discussion

A CLIMAX to the schism in the National Association of Railroad and Utilities Commissioners was a meeting of the so-called liberal group in New York on April 8 and 9. This meeting heard Frank P. Walsh, Prof. James C. Bonbright, Prof. William Z. Ripley, Morris L. Cooke and others express their well-known sentiments with especial emphasis on the holding company as a "disease" whose symptoms were "irrational consolidation, overcapitalization and uncontrolled service charges." Newspaper releases as usual contained the attacks and radical viewpoints.

The meeting showed the real purpose of the gathering to be a forum for the dissemination of radical propaganda. The headline speakers were not utility commissioners, nor was the meeting representative of the commissioners or of informed students of the industry. President Murphy of the National Association of Railroad and Utilities Commissioners was sound when he asserted recently that the national organization offered every possible opportunity for regulatory authorities to speak and act and that the complaints of the "liberal" group were without substance. The New York conference showed that the group desired a program of propaganda by non-commissioners instead of a discussion of regulation by those experienced in the subject.

Speakers at the New York meeting as usual generalized from incidents. They drew upon stock market prices of holding-company securities in an effort to demonstrate that the generalizations were true. Annual reports of individual holding companies are available to show the very constructive action that has been taken by holding-company executives to meet present conditions and to show that actual earnings and financial conditions are not reflected in stock market values. Never has the industry cleaned house so thoroughly or placed itself upon such a sound basis as during the present depression. Parallel with this internal change in utilities is the very marked progress made in state regulation. These constructive developments in the public interest, however, had no place on the New York program. This sample of a "liberal" forum is sufficient to indicate the malicious and distorted motivation of those sponsoring the meeting.

Facts wanted on wooden-pole life and application

CHANGE in the relative status of cedar and creosoted yellow pine and the increasing use of the latter have definitely awakened the cedar-pole suppliers to the danger that they are running. They are now engaged in the very commendable enterprise of gathering actual and reliable information on the relative life of the two classes of timber. Such information will be welcomed by every utility executive, engineer and line superintendent.

But there are grave dangers connected with their enterprise. There is danger first that the extent of the job will be underestimated. In other words, to be impressive and carry authority the survey should be so extensive and complete that there can be no question of the data being fully representative of all the facts. That, obviously, is not a matter to be accomplished in a few weeks. Second, there is danger that the survey will be directed against some putatively competing grade of lumber, whereas what is needed is a survey that will show what kind of pole is most economical or is the right one to use under a given set of economic and geographical conditions.

The industry badly needs an authentic guide

to the proper selection and purchasing of poles. A broad survey undertaken and carried out in a proper and scientific spirit will not only help the pole users but will also assure each group in the lumber industry those markets which logically belong to it. But a survey undertaken and carried out in a narrow and partisan spirit carries with it the dangerous possibility of total loss of market to some other and perhaps as yet unheard-of competitor. Too many such examples exist in other industries to make further proof necessary.

The plan for complete new-residence equipment sales

PROBABLY the most important decision that has been made in recent years by the power-company commercial men was the vote by the N.E.L.A. Commercial Section at its recent meeting to go ahead with the promotion of complete residence equipment sales. For this idea will advance tremendously the eventual adoption of electrical labor-saving appliances as standard for the new home in America.

The idea is not new. But, like all ideas that step forward courageously, it has taken time for it to sink its roots and win acceptance. The fact that electrical men have always been accustomed to sell appliances one at a time to families in old homes has built up an obstructing tradition. The sound suggestion that a complete equipment of all the economically desirable major appliances might just as well be installed, built into all new houses when they are constructed and financed under the original mortgage, has had to fight this precedent. Men are reluctant to try new ways. They are timid about asking for thousand-dollar orders when they are used to hundred-dollar sales. They hesitate to try to sell these expensive devices in complete sets for cash when they have for so long laboriously merchandised them singly on installment payments. But gradually over a period of five years or more the logic of it has prevailed, and now an organized promotion is to be initiated.

There was much argument over whether or not this is a good time to start such a movement. It is. For both the idea and the method by which the idea must be promoted will require much selling—first to the power companies themselves, then to speculative builders, to building and loan associations and to local mortgage bankers. It will take time and effort before all these interests will recognize that the installation of these electrical improvements in the new house is, after all, just an extension of the accepted practice of making the modern home attractive with tinted tile bathrooms, automatic heat control, decorated walls, artistic hardware. It appeals to the purchaser, speeds the sale for the builder and improves the risk for the money lender. It has been proved both practicable and profitable.

After much urgent preaching and several years of discussion, J. H. Van Aernam of Albany has carried the idea through. His committee has been authorized to put his well-seasoned plan in the hands of the chief executives and sales managers of the N.E.L.A. member companies. It should be adopted in every city and the work started now, so that at the lift of general business recovery, when home building starts in a big way, the process of local argument and education will have been completed.

Emotional appeals will "sell" the range market

THERE is a campaign on to sell a million ranges this year, but if you were not told you might never be aware of it. Of course, you hear about ranges, but you probably have not received a full-color printed folder or seen repeated presentations in national advertising of the juciest, tastiest-looking roast of beef that ever made a hungry man's mouth water, tied in with a few words of text to point out just how incomparably delicious the product of an electric range really is. By the way, as an electrical industry man, do you know how full-flavored and tender it can be?

What does the average electrical industry man or woman—executive, engineer, salesman, manufacturer or dealer—think of when electric ranges are mentioned? Preservation of flavor and moisture, comfort, safety and better atmospheric conditions, perhaps—but they are dull and lifeless engineering terms.

Reese Mills of Westinghouse hold last week a little story of "The Range That Nobody Knows" —one that leaves you hungry and eager for what you recognize to be the only way to cook as all the cumulative skill of the ages has been gathered that you may do. Engineering

performance facts about ranges can be proved only too well. The emotional appeal which makes the prospective buyer reach for the pencil and peer for the dotted line has been omitted.

Unused capacity does not prove overbuilt systems

CRITICISM that utilities have in many cases overbuilt their plants and systems deserves refutation where commitments were made on the basis of sound engineering judgment to meet the load developments in sight at the time the investment took place. This matter is succinctly discussed in the report of the North American Company for 1931. At the close of the year the total plant capacity, exclusive of 25,600 kw. of purchased power, was 1,848,944 kw. The aggregate of the maximum demands for the year on the subsidiary properties was 1,049,202 kw. This ratio of 56.75 per cent was less than for a number of years, and the unused capacity was greater than that required as a margin of safety to insure reliability and continuity of service. The major groups of subsidiaries are not interconnected in the usual sense because of their geographical separation, although it is possible that some interchange of energy between the utilities of this and other systems in the triangle between Cleveland, Milwaukee and St. Louis may be effected economically at times through co-operative arrangements. This condition justifies a larger normal reserve than with more closely knit properties.

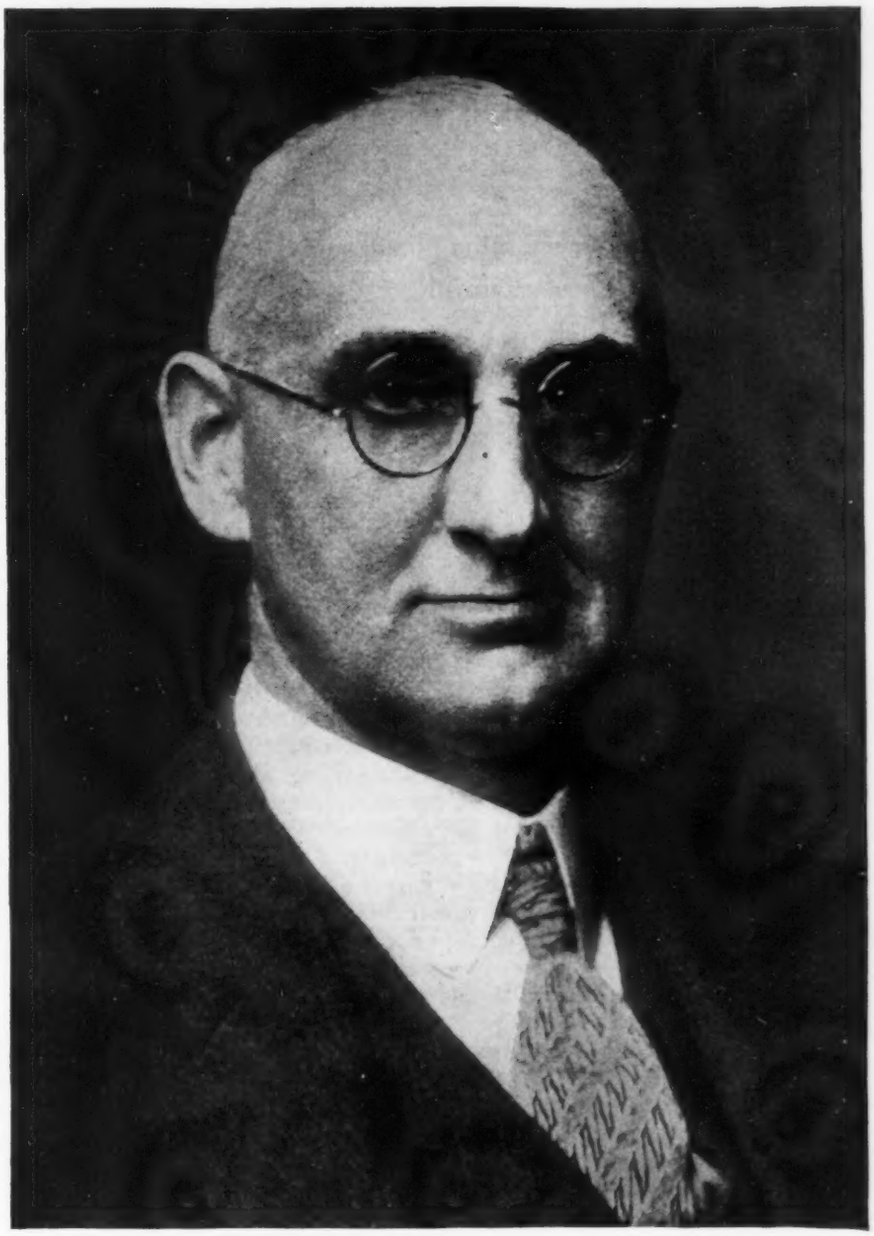
Comparison of the capacity available and that utilized, as shown by the maximum demand, indicates that a substantial part of the capacity of the subsidiaries was unsold, with consequent effect upon revenues. As Vice-President Gruhl points out, this does not indicate that the company has overbuilt, taking into account the steadily increasing demands upon the subsidiaries prior to the recession of industrial activity, the large potential demand represented by 601,757 kw. of new industrial load connected during the last three years and not at present reflected in increased output, and the required margin of spare capacity. Resumption of industrial activity and employment of most of the now unused part of the connected industrial load, including that added to the lines during the period of depression, would make necessary the present available capacity.

It should not be forgotten that it is entirely within the bounds of possibility that when business begins to pick up as a result of rapidly increasing confidence spreading swiftly throughout the country the resumption of system loads of former magnitudes may occur much faster than anticipated. The utility industry could not take the chance of a possible famine in power through the inability of its engineers to analyze and specify and that of the manufacturers to supply the heavy generating equipment needed under such conditions within the period of load acceleration from present values to those of prosperity. In its broadest sense, the power industry must always be ready to serve the public, no matter what vagaries of demand arise. Credit instead of criticism should be accorded to policies which have placed the utilities in perhaps the most attractive position as regards capacity to meet future needs that they have ever attained in their lengthening history of far-sighted service.

Meters per meterman

WHAT should be the ratio between meters and metermen in a well-operated meter department? According to data of thirty-two companies in Iowa, Kansas, Missouri and Nebraska, compiled by the meter committee of the Middle West Division, N.E.L.A., the ratio is 1,201,810 meters to 320 metermen; that is 3,693 to 1. The highest figure reported was 7,381 meters per man, and the lowest, excluding one-man meter departments, was 1,978. In the one-man departments the ratio ranged from 965 to 6,989 to 1.

Do these figures prove anything? Probably they do, in spite of the fact that maybe some of the metermen included in the data are full-time or part-time meter readers and service men. Meter testing, repairing and maintenance is a calling requiring specialized training and education and one that has been sufficiently developed and recognized to allow the assumption that these data are comparable among themselves. What these figures prove, then, is that there is a wide diversity among electric utilities in their practices of meter department organization and administration and, as a corollary, that the same diversities exist in meter department performances and costs. Is it not time for studies to be made in these directions, to permit direct comparisons of these performances and costs?



Percy S. Young

WELL known to members of the National Electric Light Association through his five-year incumbency of the office of treasurer, from which he retired in 1931, Percy S. Young is known equally well in electric railway and gas circles, having served as president of the American Electric Railway Accountants' Association, the Commercial Gas Association and the Eastern States Gas Conference. His prominence in three separate utility groups arises from the fact that his sphere is accounting and finance, of which the principles apply alike in all industrial and organization activities.

In this chosen field Mr. Young has gone far. He left a west Nebraska ranch about 1889 to take up the work of a collector for the Omaha Gas Company and got along so fast that four years later he was transferred to the Philadelphia offices of the United Gas Improvement Company, which controlled the Omaha company, and became a traveling auditor, following that occupation for ten years. In 1898 he was assigned to Jersey City as assistant agent of the Hudson County gas companies, and when a year later these companies were merged as the Hudson County Gas Company he became assistant treasurer and later secretary of that organization.

After the formation of the Public Service Corporation of New Jersey in 1903 Mr. Young was made controller. In 1914 he became treasurer, and in 1917 he was elected to his present posts—vice-president in charge of finance, member of the board of directors and member of the board's executive committee. Mr. Young's responsibilities outside the Public Service organization include those of a director of the American Gas Association and also of the Fidelity Union Trust Company, Fidelity Union Stock & Bond Company, Fidelity Union Title & Mortgage Guarantee Company, Firemen's Insurance Company and American Super-Power Corporation. He has also served as president of the Welfare Foundation of Newark and is active in civic and social work, in the Episcopal Church and in golf and country clubs.

Englishmen have for generations ranked high in the world of figures, and possibly Mr. Young owes some of his ability along this line to inheritance. For he was born in London in 1870, coming to the United States at the age of fifteen when his widowed mother settled on the Nebraska ranch to which reference has been made. He pursued courses of study long after boyhood and as late as 1908 received from New York University—of whose council he is now a member—the degree of bachelor of commercial science.

Sell the Home, Not the Appliance

Individual appliance selling limits rate of domestic market growth.

Multiple sales of appliances on co-operative basis the better plan.

Existing margins, profits and sales methods discussed.

A HOUSEHOLDER on Staten Island who was renting a seven-room house became interested in getting his home electrified in order to save money on his home expenses and in order to live more comfortably. The result was that he bought $1,225 worth of electrical appliances, used 10,000 kw.-hr. of energy for 1931 and paid the local utility $254 for the service. Yet he saved $80 a year on replaced or equivalent non-electrical services (Table I). This is domestic market development by means of creating consumer demand.

If all of the 20,000,000 domestic customers did the same thing next year would witness appliance sales aggregating $24,500,000,000, energy use of 200,000,000,000 kw.-hr. and utility income of $5,080,000,000—enormous totals and goals that should stimulate the electrical industry to the utmost.

But consumer demand has not been created and the industry sells relatively little of the market each year. About 30 kw.-hr. per customer and $30 worth of appliances is the increment rate despite years of sales effort by some 250,000 sales outlets.

These results are an indictment of the commercial efficiency of all interested industry groups. There is something wrong or imperfect in the sales philosophy and in the sales mechanism. Electrical dealers say they are doing their best and are making no money, and this story is repeated by the jobber, the utility merchandise department, the department store and the appliance manufacturer. The dealers say their margins are too small to do business profitably—they need at least 50 or 60 per cent margin. The jobbers say 15 per cent margin forces them to be warehousemen instead of sales outlets, the utility merchandise departments say they lose money on all appliances except the shelf type, the appliance manufacturer says he makes little or no money and is limited in sales promotion by his margins. Then, to make the situation more confusing as well as more inert, each sales outlet puts the blame on the other outlets or on the jobber, utility or manufacturer for his lamentable business position. Each agency says it knows there is an enormous market, but that it is helpless to sell beyond a certain rate because of competition, margin of profit or the mechanism for distribution of which it is a part. Add to these elements good and bad quality appliances, code and wiring disputes and anti-trust laws to give spice to the potpourri.

Apparently a commercial Moses is needed to lead the industry out of the distribution wilderness. Some hundreds of candidates are available with magic wands, but not one can prove he is the real Moses. Nor, if a Moses is found, can anyone guarantee the electrical industry will follow him; discipline was lost in the feudal era of civilization.

Price to consumer

Efficient merchandising means a mechanism to get appliances to the consumer at a fair price and in volume. A little study of the full-use home on Staten Island shows that this householder bought the appliances as individual items for $1,225. Assuming normal margins and a single dealer, these appliances were purchased for $804 from, say, a jobber. This jobber, in turn, purchased the appliances from the manufacturer for $690. Roughly speaking, it cost $600 to make the appliances and $625 to sell them. Is this margin too great or too small?

From the point of view of the consumer, if he knew what it was, the margin is too great. But in merchandising, if consumer demand is created, the consumer purchaser does not think of sales margins, but of service value to him at a known purchase price. Undoubtedly, however, if the sales price were decreased the consumer market would be increased, provided an equal consumer demand were created. Consumer demand creation determines whether he buys a $1 or a $5 safety razor, not his impression of the profit made by sales agencies.

What does the dealer think of his margin? A typical small dealer says that his margin of $421 is adequate and more than adequate if the consumer comes to his store and buys all the appliances at one time from him. But if he had to go to the consumer time after time and sell him each appliance as a special sales task the margin would be inadequate. He details his business and shows his accounts for his business as illustrated in the accompanying typical table. He says he has to pay 70 per cent of sales price for his goods on the average, with smallest margins on the expensive appliances. Out of 30 per cent margin he runs a store, buys advertising, makes sales, takes care of deductions and reverts, pays administration expenses and tries to get a profit. He then shows that he gets a living, but no profit, and argues that his cost of goods should be only 60 per cent of sales price (Table II).

Then suppose he is told that he should not be in business unless he does $600,000 a year, instead of $60,000, so that his costs in proportion to sales would be decreased; that he is an uneconomical unit in distribution. His answer is the familiar "Oh, yeah?" He says: "About 60 drug stores in this town sell less than $400 worth of electric appliances a year and seem to remain in business." It is a long and difficult process to prove to a

man in business that he is an uneconomical unit or to explain to him the complexities of selective marketing.

Perhaps the utility merchandising department sold this customer his appliances. An interview with the merchandise manager brings a repetition of the dealer story. He says: "I don't control the accounts and charges made against my department; these are fixed at headquarters. My business is to keep in the black on my sales each year. If the consumer comes in here and buys all those appliances at one time my margin of $421 is adequate for that one sale, but he doesn't buy that way. If I have to sell him by going to his home to sell each appliance then I lose money. Besides, I have overhead, advertising, contributions to local campaigns and charges for rent that run my operating costs very high. What I do is to sell shelf appliances and devices that consumers come after as hard as I can and pioneer heavy-duty, high-sales-cost devices just to the degree I can keep my books in the black. Give me more margins on the heavy-duty devices and I can increase the sales very largely. I am stuck as part of an inflexible system and as a part of a big utility enterprise."

Then you may point out the great load-building advantages of aggressive sales and the revenue appliances bring in. His reply is the usual, "Tell that to the big chiefs, I don't get credit for that in my sales margins. If they will let me take a loss as a merchant, then I can

Table I—An Actual Customer Buys an Electric Home

A seven-room 10,000-kw.-hr. house

Annual energy use	**10,000**
Maximum demand, kw.	**9**
Annual electric bill	**$254**

	Watts	Retail Price	Dealer Price	Wholesale Price
Kitchen				
Range	8,500	$150	$109.50	$90.00
Water heater	2,000	150	90.00	90.00
Refrigerator	200	200	146.00	120.00
Fireless cooker	1,000	10	6.40	5.44
Dishwasher	200	100	60.00	51.00
Tea kettle	1,000	6	3.84	3.26
Iron	500	6	3.84	3.26
Egg beater	100	21	12.60	10.71
Cream mixer	50	5	3.00	2.55
Corn popper	400	2	1.20	1.02
Lighting units	150	18	12.60	10.71
	14,100	$668	$448.98	$397.95
Dining and Breakfast Room				
Auto-toaster	1,000	$10	$6.40	$5.44
Room heaters (2)	2,000	20	12.80	10.88
Waffle iron	1,000	15	9.60	8.06
Lighting units	150	20	14.00	11.90
	4,150	$65	$42.80	$36.28
Living Room				
Room heaters (2)	2,000	$20	$12.80	$10.88
Radio	100	200	116.00	98.60
Vacuum cleaner	100	50	30.00	25.50
Lighting units	600	45	31.50	26.78
	2,800	$315	$190.30	$161.76
Bedroom				
Room heater	1,000	$10	$6.40	$5.44
Sewing machine	50	50	35.00	29.75
Heating pad	60	6	4.20	3.58
Curling iron	40	5	3.20	2.72
Lighting unit	100	10	7.00	6.10
	1,250	$81	$55.60	$47.59
Bedroom				
Room heater	1,000	$10	$6.40	$5.44
Health lamp	500	15	11.85	10.08
Electric toys	200	30	18.00	15.30
Lighting	100	10	7.00	6.10
	1,800	$65	$43.25	$36.92
Miscellaneous and lighting	100	$8	$5.60	$4.76
Bathroom				
Room heater (fan type)	1,000	$15	$11.85	$10.08
Lighting	100	8	5.60	4.76
	1,100	$23	$17.45	$14.84
Total	26,620	$1,225	$803.98	$690.10

Table II—Cost of Doing Business as a Dealer

(a) Typical Electrical Dealer Selling $60,000 Annually

	Per Cent of Total Sales	Actual
Occupancy	5	$3,000
Administration	10	6,000
Direct selling	10	6,000
Advertising	3 + (3 from mfg. co.)	1,800
Servicing	2	1,200
Other costs	2	1,200
Deductions	3	1,800
Cost of goods	60 (he pays 70 now)	36,000
Profit	10	6,000

(b) Typical Discounts to Dealers

Washing machines, vacuum cleaners	40
Lamps	21
Refrigerators, Ranges	27 — through distributor, otherwise 40
Toasters, shelf appliances	36
Floor lamps	50
Health lamps	30 — some carbon, 50
Radio	42

Table III—Typical Utility Selling $500,000 Worth of Electrical Appliances Annually

	Per Cent of Net Sales	Amount
Net sales	100	$500,000
Net cost of merchandise	68	340,000
Handling expense	6	30,000
Gross profit	26	$130,000
Management	5	25,000
Direct selling	13	65,000
Advertising	3.5	17,500
Salesroom supplies and expenses	2	10,000
Accounting and collecting	4	20,000
Total selling expense	27.5	$137,500
Net loss	1.5	$7,500
Estimated annual operating revenue added from energy sales		$100,000
Cost of Serving Appliances Sold:		
(Marginal) Operating expenses:		
Energy cost, 3,333,000 kw.-hr. at 6 mills	$20,000	
Servicing within guarantee period	10,000	
Total operating expense		30,000
Additional net operating income		$70,000
(Marginal) Fixed Charges:		
Interest, depreciation and taxes on capital used for enlarging distribution and service facilities, 10 per cent on $140,000		14,000
(Marginal) additional annual net profit		$56,000
Less interest and taxes on working capital for merchandise sales (6 per cent on $500,000)		30,000
Balance		$26,000
Less loss on merchandise sales		7,500
Net profit after absorbing loss on merchandise sales		$18,500

Table IV—Appliance Selling as a Utility Business and Load Builder

Present Use of Typical Domestic Customer

System investment per customer	$500
Annual energy use per customer, kilowatt-hours	600
Annual revenue per customer	$36
Per cent revenue to investment	7.2

Case (a) — Appliances Sold at No Expense to Utility

System investment per customer		$700
Annual energy use per customer, kilowatt-hours		10,000
Annual revenue per customer, dollars		$250
Per cent revenue to investment		35.7
Increment energy cost at 0.5 cent	$47.00	
Increment investment charge at 6 per cent	12.00	
Increment depreciation and operation	20.00	
Full-use increment charges, dollars	$79.00	
Net revenue per customer	250 — 79	= $171
Per cent net revenue to investment		24.5

Case (b) — Appliances Purchased Wholesale by Utility and Sold at Cost on a 5-Year Payment Plan

System investment per customer		$700
Annual energy use per customer		10,000
Annual energy revenue per customer		$250
Annual appliance revenue per customer		120
Total annual revenue per customer		370
Increment energy cost at 0.5 cent	$47.00	
Increment system investment at 6 per cent	12.00	
Appliance investment, $600 at 6 per cent	36.00	
Increment depreciation and operation	20.00	
Annual appliance payment	120.00	
Total deductions from revenue	$235.00	
Net revenue per customer	$370 — 235	= $135
Per cent net revenue to system investment		19.3

Case (c) — Appliances Purchased Wholesale by Utility and Sold at 40 per Cent Margin on a Five-Year Payment Plan

System investment per customer		$700
Annual energy use, kilowatt-hours		10,000
Annual energy revenue per customer		$250
Cost of appliances		600
Sale price of appliances ($13.75 per month)		840
Annual appliance revenue per customer		168
Total revenue per customer		418
Increment energy cost at 0.5 cent	$47.00	
Increment investment cost at 6 per cent	48.00	
Added system depreciation and operation	20.00	
Annual sales expenses at 40 per cent	48.00	
Total increment costs	$163.00	
Net revenue per customer	$418 — 163	= $255
Per cent net revenue to system investment		32
Per cent net revenue to appliance and system investment		19.6

Case (d) — Appliances Purchased Wholesale by Utility and Given Away

System plant investment per customer		$700
System appliance investment per customer		600
Annual energy use per customer		10,000
Annual revenue per customer		$250
Per cent revenue to investment		19.2
Increment energy cost at 0.5 cent	$47.00	
Increment investment charge at 6 per cent	48.00	
Added system depreciation and operation	20.00	
Appliance depreciation, six years	100.00	
Total increment costs	$215.00	
Net revenue per customer	$250 — 215	= $35.00
Per cent net revenue to system investment		5

show them an over-all profit, but try to sell them the idea! Why, I can't even push sales aggressively without mixing public and dealer relations with my merchandising as limiting factors."

A similar story is told by the jobber. He says he can't do a selling job on an average margin of 15 per cent. This gives him insufficient money to help dealers, do advertising, give demonstrations and build business. Then the manufacturer tells his story of the cost of national sales, advertising, etc., whereby he makes little money and is restricted in his rate of market development. He also points out that local market area competitors are increasing and cut into his volume seriously. He points out the cost of creating consumer demand at his individual expense and the limitations he finds in doing business through jobbers, distributors, utilities and dealers.

This is an old story and it may be heard in each local community or in national headquarters. Individual enterprises all know the magnitude of the domestic market, but each finds a definite limitation on its development of this market at a high rate.

Two alternatives available

Unless the industry wishes to keep plugging away at the domestic market at the present rate there appear to be only two alternatives for more rapid expansion of the business. One is to increase sales margins on individual appliances very greatly and use the margins to create consumer demand and to do high-pressure selling of individual appliances. The refrigerator in the last two or three years is an example of this kind of merchandising.

The second alternative lies in readjusting the distribution mechanism to bring about multiple selling and co-operative selling. Each community can develop a merchandising plan based upon the co-operation of local sales outlets and a sales approach to each home whereby groups of appliances are sold at one sale under an adequate sales and payment plan with provision for handling the paper.

We believe the high-margin, high-pressure selling of a single appliance method is restricted to pioneering periods only. It is an economical and effective way to introduce a new device, but as consumer acceptance and sales saturation increase it becomes less effective as a method to secure sales volume economically. Thus the second alternative is best for the sale of the large number of standard appliances, for it gives greatest value to the consumer and makes possible the fullest possible market volume by reason of its minimum consumer cost and minimum sales cost per appliance.

Utility selling

The value of complete electric rooms and homes to appliance manufacturers is readily computed. The utility that supplies these rooms and homes, however, has a larger stake in the market. This comes about because it is a merchant, if it sells the appliances, and because its revenue from appliance use continues year after year.

Some idea of the relative effects of different plans to develop the market is given in Table IV developed from present averages and the expansion of this average to that of the full-use customer shown in Table I. The system investment per customer is rather high, to start with, and an additional $200 per customer is added to care for extra investment in system service facilities. A flat sum of $20 per customer is added to care for increased overhead operating and service expenses for the full-use customer.

It is seen in Case (a) that *if somebody sells the customer the appliances at no expense to the utility* the utility gets an increased revenue from each customer of

Table V—Effect of Rate of Selling Full-Use Customers 10,000 Kw.-Hr. per Year

A. Value of Appliances Sold — Five-Year Plan			
Number customers per year	1,000	10,000	100,000
Value at $840 per customer	$840,000	$8,400,000	$84,000,000
Selling expenses at 40 per cent	240,000	2,400,000	24,000,000
Purchases at $600 per customer	600,000	6,000,000	60,000,000
Five-year total sales	$4,200,000	$42,000,000	$420,000,000
B. Increased Revenue from Energy — $250 vs. $36 per customer			
Year 1	$214,000	$2,140,000	$21,400,000
Year 2	428,000	4,280,000	42,800,000
Year 3	642,000	6,420,000	64,200,000
Year 4	856,000	8,560,000	85,600,000
Year 5	1,070,000	10,700,000	107,000,000
Cumulative total	$3,210,000	$32,100,000	$321,000,000
C. Cost of Serving and Selling Appliances			
1. Energy at 0.5 cent			
Year 1	$47,000	$470,000	$4,700,000
Year 2	94,000	940,000	9,400,000
Year 3	141,000	1,410,000	14,100,000
Year 4	188,000	1,880,000	18,800,000
Year 5	235,000	2,350,000	23,500,000
Cumulative total	$705,000	$7,050,000	$70,500,000
2. Operation and Service at $20 per Customer			
Year 1	$20,000	$200,000	$ 2,000,000
Year 2	40,000	400,000	4,000,000
Year 3	60,000	600,000	6,000,000
Year 4	80,000	800,000	8,000,000
Year 5	100,000	1,000,000	10,000,000
Cumulative total	$300,000	$3,000,000	$30,000,000
3. Fixed Interest Charges on $200 per Customer Additional Distribution Facilities at 10 per cent			
Year 1	$20,000	$200,000	$2,000,000
Year 2	40,000	400,000	4,000,000
Year 3	60,000	600,000	6,000,000
Year 4	80,000	800,000	8,000,000
Year 5	100,000	1,000,000	10,000,000
Cumulative total	$300,000	$3,000,000	$30,000,000
4. Interest Charges on Working Capital $600 per Customer at 6 per cent			
Per year	$36,000	$360,000	$3,600,000
Cumulative total (five years)	$180,000	$1,800,000	$18,000,000
5. Sales Expense at $240 per Customer			
Per year	$240,000	$2,400,000	$24,000,000
Cumulative total (five years)	$1,200,000	$12,000,000	$120,000,000
D. Net Results from Cumulative Totals for Five Years			
1. Income added	1,000	10,000	100,000
Added energy revenue	$3,210,000	$32,100,000	$321,000,000
Appliance sales	4,200,000	42,000,000	420,000,000
Total	$7,410,000	$74,100,000	$741,000,000
2. Expenses added			
Energy	$705,000	$7,050,000	$70,500,000
Operation and service	300,000	3,000,000	30,000,000
Interest on system	300,000	3,000,000	30,000,000
Interest on working capital	180,000	1,800,000	18,000,000
Cost of appliances	3,000,000	30,000,000	300,000,000
Sales expense	1,200,000	12,000,000	120,000,000
Total expenditures	$5,685,000	$56,850,000	$568,500,000
Net added profit	$1,725,000	$17,250,000	$172,500,000

$171—about five times the present return. But, at present, nobody sells the customer the appliances, so these returns are not possible.

In Case (b) it is assumed the group of appliances is purchased wholesale by the utility for $600 and sold at no profit to the customer on a five-year payment plan. Under this scheme the utility receives an increase of $135 from each customer after taking care of all costs and expenses. *But no allowance is made for the cost of selling these appliances to the customer.*

In Case (c) the utility buys the appliances wholesale for $600 and adds 40 per cent margin when it sells them to the customer on a five-year payment plan. Under this plan the increase to the utility per customer is $255, covering both energy and appliance profits. If the full 40 per cent margin is used in selling the appliances to the customer the increase would be comparable to that in Case (b).

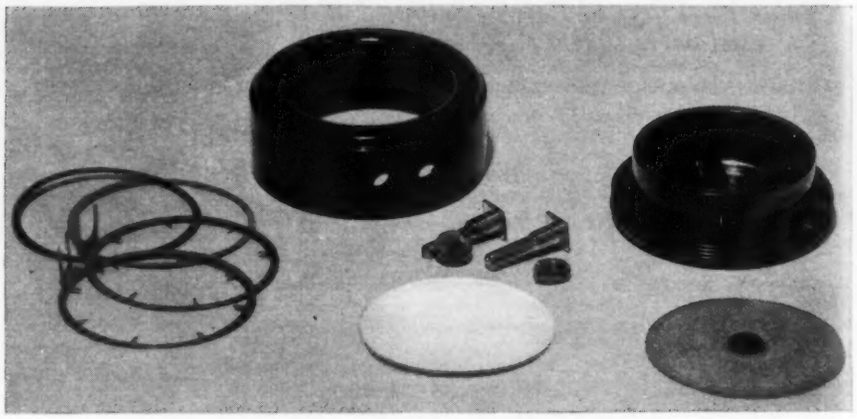
It is sometimes claimed that it would be profitable for the utility to purchase the appliances wholesale and give them to the customers. Case (d) shows a balance sheet for these conditions and the results are unfavorable when compared to even the present-use returns. But this balance sheet depends in a specific case upon the magnitude of the system investment per customer, the cost of the appliances and the energy rate.

Volume of sales essential

The domestic market cannot be developed profitably by single appliance sales or by a piecemeal approach. Each home and each room should be sold on a full-use, one-sale program, and the larger the number sold in a given period the more money there is available for creating consumer demand and for selling.

This point is illustrated in Table V. Here it is assumed the utility sells full-use homes at rates of 1,000, 10,000 and 100,000 per year. It does this by buying appliances at wholesale and sells them on a margin of 40 per cent. The results are astonishing, but self-evident upon analysis. The cumulative effect of the revenue from energy sales is often neglected or minimized by utility executives, yet over a period it is the basic justification for going into the red as a merchant in order to force high-rate market development. In the final summation of part *D* the net added profit simply means these sums could be spent, say fifty-fifty, in lowering rates and increasing selling pressure.

These typical analyses lead to the conclusion that the domestic market should and can be developed at a rapid rate to the advantage of participating sales outlets and the utilities. The approach is found by using each community as a starting point for a local co-operative sales program adapted to existing conditions and applied to bring about a sales approach using one-sale, multiple-selling of appliances, service to the home owner, time payments, combination rates, financing of paper and other tools that several experiments in different localities now make available. In addition, bring the load-building incentive of the utility to bear in a definite way, both to create consumer demand and to accelerate the sales rate. On top of this the appliance manufacturer and jobber should adapt their organizations and sales programs more nearly to fit the diversity of conditions found in each locality and to fit more easily into multiple-appliance-selling methods.



Merely a disk, contact fingers and container

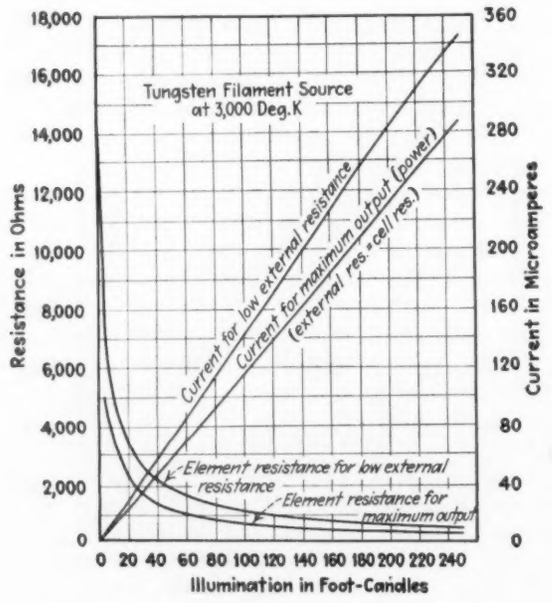
Contact rings (at left) tap voltage difference of upper, sensitized surface and lower, unsensitized surface of disk (at right).

Photronic Cell a Direct Aid to Better Lighting

By ANTHONY H. LAMB

Engineer Weston Electrical Instrument Corporation, Newark, N. J.

LUMINOUS energy has been converted into electrical energy by various methods over a period of nearly one hundred years, but the simplest, most direct conversion has just recently been made possible by the perfection of a new photo-electric cell, known as the "photronic cell." The cell consists of a flat, dry plate of metal with a suitably sensitized face, which merely requires a set of fingers making contact with the face and back to become a generator of electricity when exposed to light.



Microamperes proportional to foot-candles

Cell has fortunate characteristic that its voltage varies inversely with its resistance.

This new tool of illumination science approaches the ideal of usefulness in that its inherent characteristics fulfill the following prime requisites: Electrical output is in direct proportion to the luminous input, life is indefinitely long, temperature coefficient is negligible, not adversely affected by the most intense light or by ordinary atmospheres, spectral response almost matches that of the human eye, requires no auxiliary voltage or amplifier to operate standard sensitive instruments and devices.

The "photronic cell" opens up a wide range of possibilities in connection with better lighting everywhere as it makes possible not only a simple, accurate, direct-reading, light-measuring instrument but also allows the construction of an inexpensive, automatic illumination control device to supplement daylight. Applied as an illumination meter, or foot-candle meter, it seems to offer the much-needed impetus to higher levels of lighting intensities and better quality of lighting because it provides the illuminating engineer, the architect, the interior decorator and others with a direct-reading meter requiring no skill in manipulation or interpretation.

The construction of the cell is so obviously simple that it should give trouble-free operation even under the most severe usage. In contrast to other types of photo-cells the "photronic cell" is not evacuated and contains no liquid or gas other than atmospheric air. The cell may be exposed to light of any intensity, even direct sunlight, for any length of time and will continuously produce current in proportion to the light. Continuous current drain does not cause deterioration, since, so far as has been determined, no physical or chemical change occurs. The cell simply transforms the light energy to electrical energy without itself being in any way deteriorated; in this respect the cell might be compared to a catalyst as used in chemistry, which by its mere presence causes a transformation of another substance. Fatigue effects are slight and tests indicate that the response remains constant to a high degree of accuracy for an indefinite period of normal use.

The resistance of the cell is a function of both the current output and the intensity of illumination and the current output is linear for low values of external resistance. The direct proportion between luminous input and current output (for vital short circuit) exists under this condition of varying internal resistance, since for some inherent reason the voltage of the cell varies inversely to the resistance.

For most practical uses the temperature coefficient need not be considered, as for ordinary room temperature changes the error will rarely reach 1 per cent, and when used outdoors, even under severe temperature changes, the error rarely reaches 3 per cent with the most unfavorable conditions.

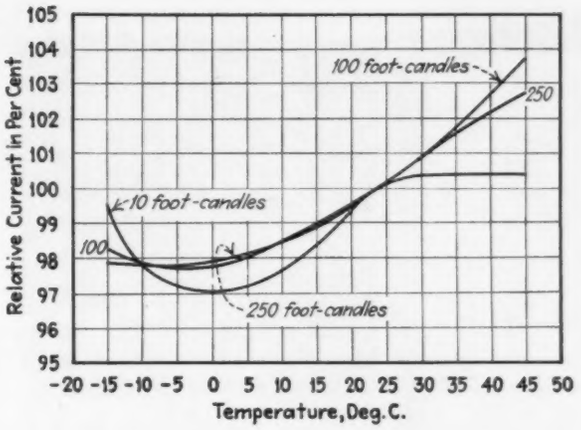
In instances where it is desired to obtain a higher current output than can be obtained from one cell it is possible practically to double the value of current by connecting two cells in parallel.

Most so-called "electric eyes" are not at all a match to the human eye so far as color response is concerned, but the "photronic cell" now makes such a match possible. The spectral (color) response of the cell is comparable to that of the human eye and it will be noted that while the curves peak at slightly different values, the cell shows greater sensitivity than the eye in both the blue and red regions. This makes possible the use of a simple filter to mold the cell response to close equality with that of the eye. Even without a filter the "photronic cell" matches the eye more closely than any other photo-cell of which we are aware.

A simple tool to improve illumination

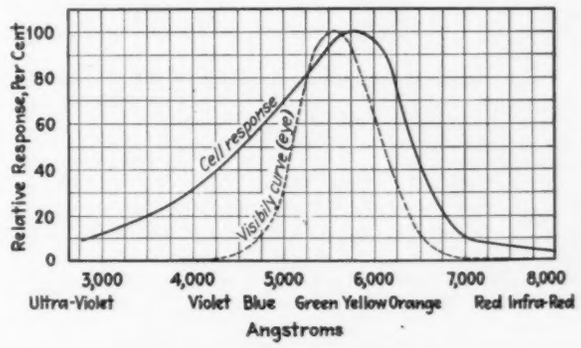
Poor quality and low levels of illumination have been ascribed as the direct cause of impaired eyesight and the chief contributing factor in most of the accidents occurring in industrial plants. While it is common practice to specify minimum illumination levels, it is not so common that any survey is made to determine if the proper condition exists. The reason is obvious when we consider that illumination-measuring instruments in general are handicapped by many of the following disadvantages: They are expensive, cumbersome, require frequent adjustment and standardization, can be used only by a technician, and also considerable time and space are required to obtain even fair results. They usually require a battery, standard lamp, rheostat, ammeter or voltmeter and an optical system, all of which contribute some error in addition to that occasioned by the human element, in that the final comparison is made by the observer's eye judging relative intensities. Even two experienced observers will often disagree as to the true values. With the "photronic cell" connected to a microammeter and suitably calibrated a direct indication of the value of illumination can be obtained anywhere in an instant. There can be little difference of opinion as the reading is as simple as that of an ordinary voltmeter.

Since it is as important for health that we work under proper light as in a proper atmosphere, such a simple meter will make it possible for health authorities to check schoolrooms and other public buildings, for insurance companies and plant engineers to check all industrial plants right down to the individual worker and machine. Public utility lighting departments can also arrange to check individual homes on request. All this will undoubtedly bring about progress toward the higher



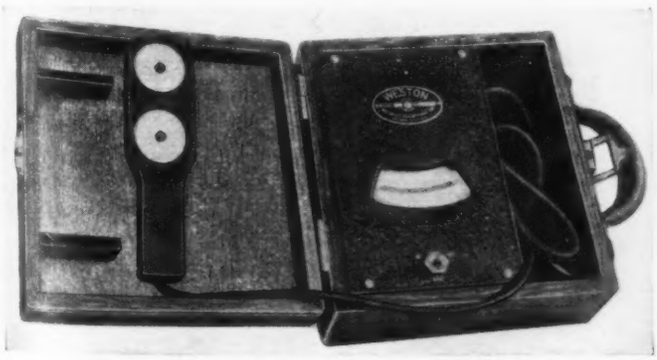
Practically negligible temperature coefficient

Foot-candles (from tungsten filament source at 3,000 deg. K) in error only 3 per cent for ordinary range of outdoor temperatures.



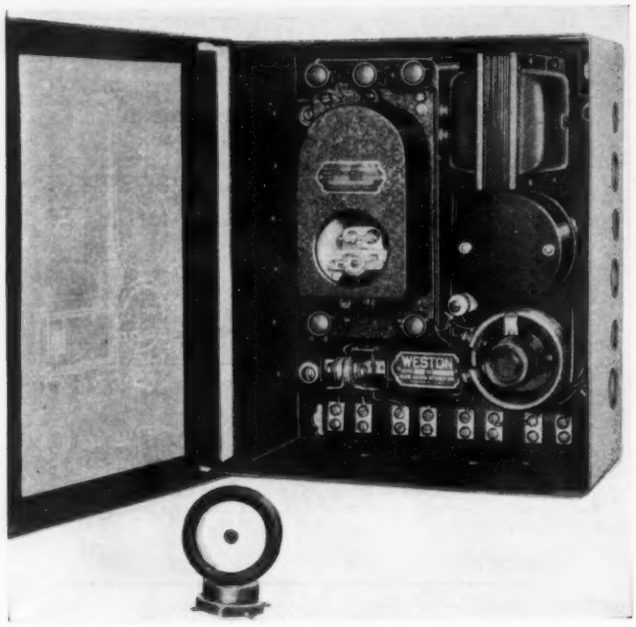
Cell responds like human eye

Simple filters can render response almost exactly identical with that of eye because cell is more sensitive in red and blue regions.



Parallel operation facilitated by constant current characteristic

Left—Two cells in parallel operate portable microammeter with range of scale from 0.2 to 250 foot-candles.
Right—Three cells in parallel in waterproof housing for roof mounting to give remote indication of natural light or remote control of artificial light to supplement or succeed daylight.



Industrial processes controlled by light beam

Speed of cell permits counting or control of operations up to 200 per minute. Similar relay adaptations available for control of outdoor illumination circuits.

levels of illumination, which oculists are beginning to realize is as significant as eyeglasses in correcting and preserving the vision of their patients.

For automatic control of illumination, industrial processes, etc., the "photronic cell" allows the construction of simple, trouble-free devices. One or more cells can be directly connected to a sensitive relay which, in turn, can control a large power relay suitable for controlling the particular electrical circuit desired. No battery or amplifier tubes are required; all control is performed by a simple relay circuit. The relay is simply connected to the 110-volt, 60-cycle line and to the circuit to be controlled and is then ready for operation. It is suitable for control or counting up to 200 operations per minute. A relay for the control of outdoor illumination such as signs, floodlights, street lights, airports, etc., is another application of the cell.

The cell housing is arranged to be mounted outdoors and the relay cabinet may be placed at any desired distance from the cell, indoors, or near the switchboard.

A record of the light from the north sky on a clear day was obtained by exposing one "photronic cell" to the north sky and connecting it directly to a standard recorder. Street lights controlled by this relay would be shut off at approximately 6:15 a.m. and turned on in the evening at approximately 5:15. The variation in illumination obtained on a rainy day is striking. At 12:17 p.m. the foot-candles measured 200, but less than ten minutes later they had increased to 1,000; at 1:40 p.m., during a heavy downpour, the illumination dropped to 8 foot-candles.

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British Alkaline Battery Uses Zinc Negative

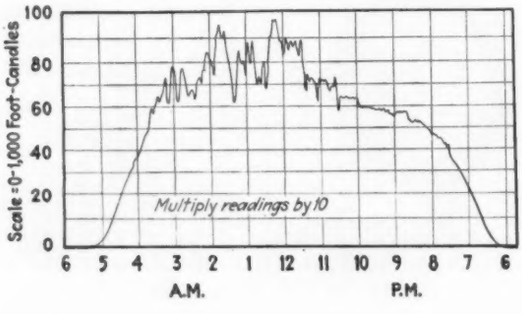
An alkaline battery maintaining high voltage during discharge has been patented by J. J. Drumm (British Pat. Spec. 365,125). It is claimed that it lends itself to either the low resistance, quick discharge or the higher capacity, higher resistance type for low charging rates. The experimental set-up described in the claims showed a 15 amp.-hour capacity for a combined plate weight of 750 grams working in 750 grams of electrolyte. The internal resistance at the half-hour discharge rate was 0.0075 ohms and when charged at 40 amp. for eight minutes the element had a capacity of 5 amp.-hours. The average voltage on 10-amp. discharge was 1.65 volts. Efficiencies on the average run as follows:

Charging Time, Minutes	Charging Rate	Capacity per Pound Weight of Battery, Watt-Hours	Approximate Ampere-Hour	Capacities Watt-Hour
8	High	2.5	95	75
20	High	6	93	70
40	Lower	9	90	65

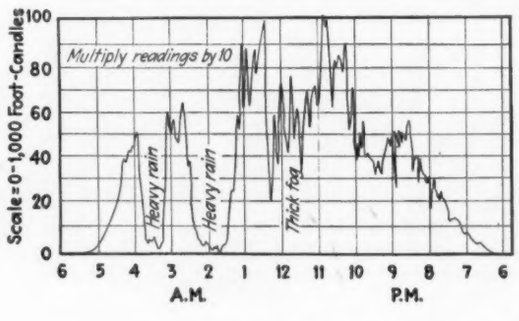
Zinc is the active negative material plated out of the electrolyte onto a nickel or monel-metal negative plate. The caustic potash electrolyte of specific gravity between 1.22 and 1.25 at 15 deg. C. is saturated with zinc oxide to a gravity of 1.245 to 1.275. The positive plate may be of many forms, but nickel oxide, graphite and silver oxide in nickeled steel pockets is said to work well. The nickel oxide and silver oxide are the depolarizing agents.

Preceding the forming process the negative is subjected to hydrogen evolution for several hours and then the rising voltage leads to deposition of zinc on the negative. Dipping for a few seconds in a weak solution of potassium mercuric cyanide or sulphocyanide facilitates the forming. The container is nickel-plated steel, rustless steel or monel metal. Addition of 1 per cent of aluminum hydrate or beryllium hydrate to the electrolyte strengthens the cell for excess discharge over long periods. Copper terminals are tinned and screwed at high temperature into iron pole pieces of special purity and high electrical conductivity.

North sky on clear November day



North sky on foggy and rainy November day



Comparison of Substation Grounds*

By WALTER B. MORTON† and BASIL PAYNE‡

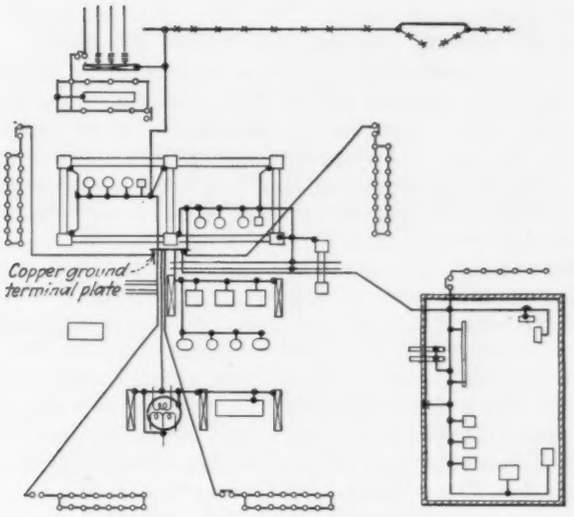
THREE general classes of substation grounding systems are available for use—radial, bus and grid, or combinations of these three. In the radial system the length of the leads, and consequently the path between any group of structures and the earth electrodes, may become excessively long and be far from the most direct route possible. The presence of several bolted connections in series does not improve the situation. Should a fault develop in any one lead, the group of structures connected thereto would be isolated from the rest of the ground system, with attendant possibility of dangerous potential gradients.

The bus system offers many marked advantages and is much to be preferred over the radial system. In this system a loop or ring bus is placed around all, or nearly all, of the station structures. To this bus are attached all the individual structures and equipment ground connections, either radially from the loop or as sub-loops within the main bus. All ground groups are also attached to this bus. It is evident that the length of any connection between structure and bus is relatively short, and, furthermore, the effective resistance of the complete ground connection is less than that of a corresponding length of cable because, from the point at which the tap connects to the ground groups, there are parallel paths to earth. Where the taps form sub-loops, the number of parallel paths is still greater and the resistance correspondingly less. This multiplicity of paths minimizes the possibility of a failure of the ground connection since the probability that all connections will fail at one time is exceedingly remote.

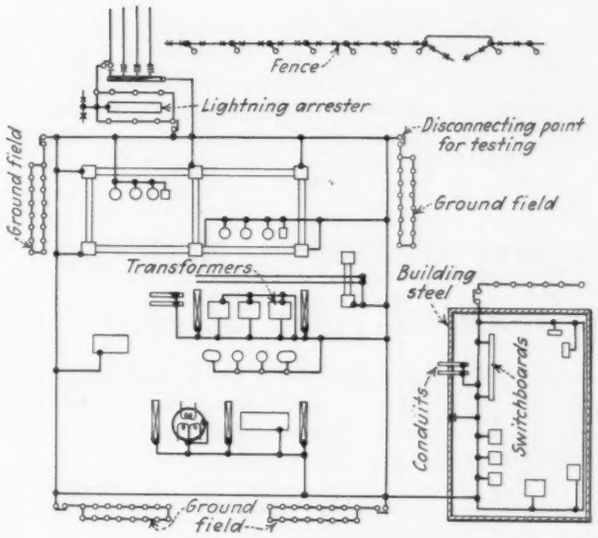
With the grid system a ground rod may be driven at each intersection, or, if soil conditions warrant, every other intersection. Equipment and structures are connected to the grid at the nearest point and the number of parallel paths between any such tap connection and the ground electrodes results in a path of high conductivity and low resistance.

Of the three schemes, the grid system is to be preferred from the standpoint of efficient grounding, but the bus system is considerably less expensive and quite satisfactory.

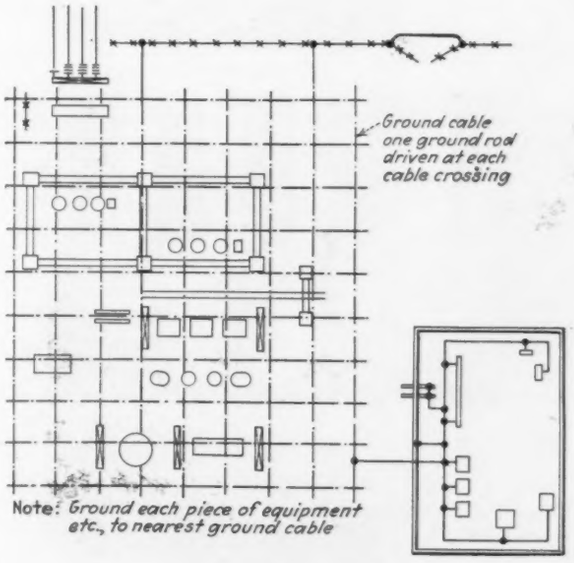
The size of the conductor required for the ground bus is somewhat indeterminate. For mechanical reasons sizes smaller than No. 2/0 should not, in general, be used and a minimum size of No. 4/0 is preferred for buses. A safe rule to use in determining the size of copper cable is: $CM = K \times I$ in which CM is the area of the cable in circular mils, K is a constant and I is the maximum three-



Radial grounding system



Bus system of grounding


Ground cable one ground rod driven at each cable crossing
Note: Ground each piece of equipment etc., to nearest ground cable

Network ground

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†Philadelphia Electric Company. ‡ Fairfield, Me.

phase short-circuit current. The value of K may be taken as 35 for currents between 2,000 and 40,000 amp.

Soldered connections should be avoided in the ground system where possible due to their tendency to corrode. Suitable clamp type fittings are available in varying shapes and sizes to accommodate an unlimited number of conductor arrangements. Wherever it can be done economically, brazing is the most satisfactory and permanent of connections.

Material for ground electrodes may be cast iron, steel, copper-covered steel, or copper. The resistance of the surface contact between electrode and soil is negligible, since the resistance of the soil itself, which varies from a few hundred to over a million ohms per cubic centimeter, largely determines the effective conductivity of the electrode. Driven electrodes should extend at least 6 ft. below the surface and preferably ten. Since it has been found that 90 per cent of the total resistance of a driven ground is within a radius of 6 to 10 ft. around the electrode, the most satisfactory results will be obtained if the electrodes are spaced not closer than 6 ft. and no more than 10 ft.

The resistance of the complete station ground system for large stations should never be greater than .1 ohm and preferably less. On less important stations values up to 5 ohms may be satisfactory, increasing to as much as 15 ohms for the small, isolated distribution substations.

▼

Slagging of Boilers Reduced by Studded-Tube Screens

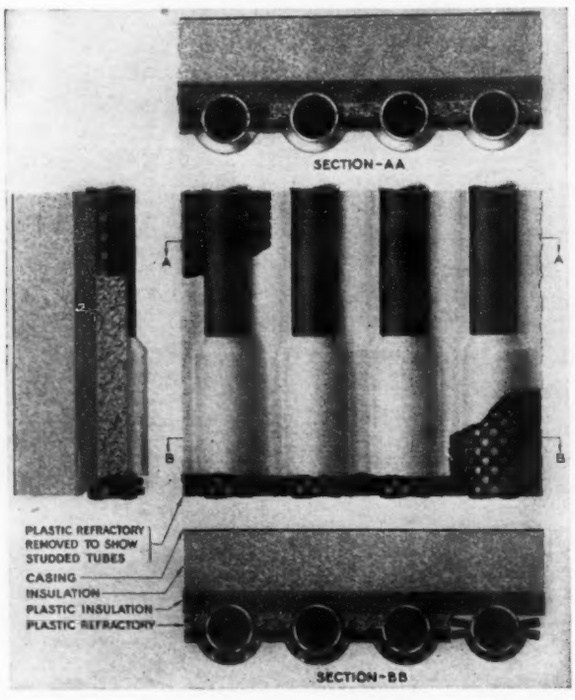
To reduce the slagging of main boiler tubes when low-grade fuel is burned in powdered form studded-tube slag-screen baffles have been installed between the furnace and lowermost boiler tubes of No. 5 boiler in State Line station with very effective results. The screen, which is situated and arranged as shown in the accompanying illustration, consists of $2\frac{11}{16}$-in. diameter water tubes on which are welded closely spaced metal studs. Each tube is covered with refractory material to an outside diameter of 5 in. This construction presents a hot, sticky surface upon which ash and slag readily collect, but still allows the desired rate of heat transfer. At all normal ratings the furnace temperature is such that the slag melts and runs down into a slag pool. Ash that does pass the screen is cooler and less sticky, so that slagging of the main boiler tubes is greatly reduced.

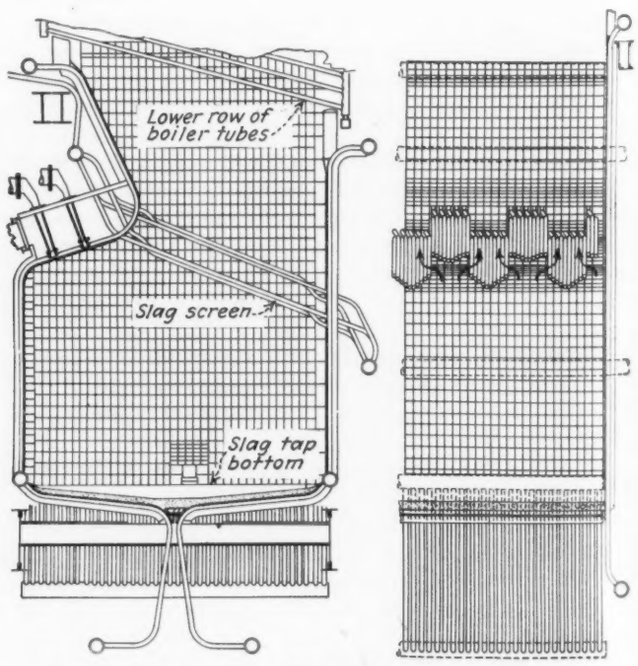
Illinois coal containing a high percentage of ash, sulphur and pyrites is burned in this plant and heat has been liberated under the slag-screen at the rate of 50,000 B.t.u. per cubic foot.

While block-covered tubes have been very satisfactory for furnace walls, it was decided to try studded-tube construction on No. 6 furnace walls. The walls are composed of $3\frac{1}{4}$-in. tubes on 6-in. centers. The lower portion of the tubes is studded on the side facing the furnace and covered with refractory; the upper portion is only studded between adjacent tubes and this space covered with refractory. The boiler has been in practically continuous service since the new wall was installed in September, 1931. It is reported that this construction is suitable for higher ratings, and if necessary even lower grades of fuel may be utilized.

This development was made by the Babcock & Wilcox Company in co-operation with Sargent & Lundy, Inc., and the Chicago District Electric Generating Company. The manufacturer points out that blocks clamped to tubes will remain the most desirable wall construction for many places and are probably necessary on and around the bottom of slag-tap furnaces. But the new stud tube with its lower cost appears to hold interesting possibilities especially for pulverized-fuel furnaces and the combination of the two types can meet a wider range of conditions.

Arrangement of studded tubes for furnace wall

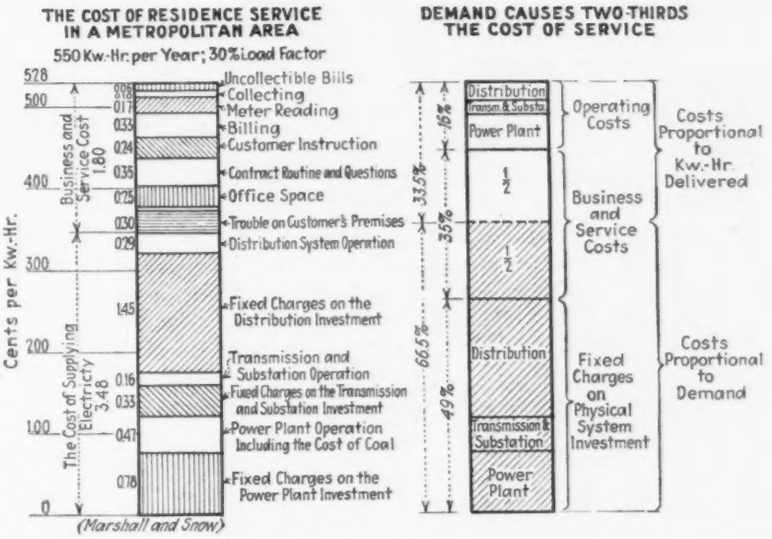




Baffle-like slag-screen between boiler and furnace reduces slagging of boiler

Demand Metering Deserves More Prominence

By A. E. KNOWLTON*
Associate Editor ELECTRICAL WORLD



Demand costs are two or three times as significant as operating-production costs

IN MANY respects the demand meter gives a truer index of the cost of rendering electric service than the watt-hour meter, with which it is usually associated. This is destined to be even more the case if investment per customer continues to rise and costs of generating a kilowatt-hour continue to decrease.

The price charged householders for a kilowatt-hour is necessarily several times the cost of producing that kilowatt-hour at the station. Further than that, the cost of delivering a kilowatt-hour under certain unfavorable conditions may greatly exceed the price charged for that particular kilowatt-hour as part of a total monthly bill. Occasionally dump energy can be sold profitably on an increment cost basis at 2 or 3 mills per kilowatt-hour. On the other hand, it is not exaggerating one bit to say that a price of even $2 or $3 per kilowatt-hour for certain standby or very low load factor energy might actually represent a loss. These extremes represent a 1,000 to 1 spread. Most of that spread is attributable to system factors which the demand meter is aimed at registering for purposes of equitable revenue recovery.

Messrs. Marshall and Snow of the Detroit Edison Company presented at the Atlantic City N.E.L.A. convention last year an analysis of the distribution costs in residence service which has already been given the rank of a classic. Having assumed a typical metropolitan system with representative costs, they show that the cost of delivering a kilowatt-hour to a residential load of 550 kw.-hr. per year at 30 per cent annual load factor is 5.28 cents in their particular case. The authors presented a chart showing the proportions of some fifteen important components entering into this total.

Consumption costs one-third of total

Of the total 5.28 cents cost of carrying out a kilowatt-hour transaction with the customer 3.28 cents represents the cost merely of generating and delivering the unit without including the incidental business and service costs of the office in connection with billing, collections, customer service, etc. The 3.28 cents includes costs of a fixed-carrying-charge nature to cover interest, taxes and depreciation in the physical elements of the power system allocated to this residence customer; there are also the operating charges for fuel and labor at the power plant, as well as labor and supplies used up in maintaining substations and lines.

Rearranging the constituent elements of cost so as to group them as they appear in the registrations of the demand and watt-hour meters, it appears that the fixed charges of interest, taxes and depreciation on the system facilities devoted to this consumer amount to 49 per cent of the total cost. They are a measure of the investment made in providing capacity adequate to meet the demand created by the customer. The purely operating costs are principally associated with the factors affected by consumption. Even in the operating items there are some which are as much associated with the number of customers or with their demands as with their consumption of kilowatt-hours. But to credit the watt-hour meter with everything possible, we can here allocate to it the entire 16 per cent of operating cost. So far, then, it appears that the demand meter (with 49 per cent to its credit) is three times as important in recovering the proper revenue as is the watt-hour meter (with only 16 per cent).

This inference ignores, however, the business and service costs amounting to 35 per cent of the total. Some of these items will vary with the kilowatt-hour sold, others will vary somewhat with demand and system capacity, while others will be more dependent on the number of customers, regardless of their extent or classification of usage. In the absence of any better criterion let us assume these items are half of a fixed-charge nature and half operating charge varying with consumption.

**Abstract of paper presented at N.E.L.A. Engineering Section, New England Division.*

On this basis the demand meter will register a quantity which represents 66.5 per cent of the total cost and the watt-hour meter 33.5 per cent. The demand meter is still twice as important as the watt-hour meter in the case of the residence customer. Even if one treated all the business and service costs as if they were proportional to kilowatt-hour consumption and all the operating costs as if they were also attributable to consumption the ratio of importance of the demand meter to the watt-hour meter would be as 49 to 51.

This discussion so far has been based on residential usage and has carried the assumption that there would be a demand measurement as well as an energy measurement. Actually, demand meters are too expensive to be at all common in residential installations. The tendency has been to adopt a room or area or connected load basis of assessing the fixed charges. The demand is assumed to be proportional to active rooms or net floor area. It is nevertheless a demand charge just as much as one based on continuous metering, on a load test with indicating instruments, on connected load or number of outlets. The measurement is made by means of a yardstick or an adding machine rather than by an electrical instrument.

Deciding whether a demand meter shall be used to ascertain the extent to which sustained maximum draft necessitates investment in capacity to serve the customer is primarily one of cost of ascertaining the desired information. Commercial and industrial loads return enough more revenue than residential loads to be able to absorb the added cost of ascertaining the demand with greater certainty. Where the revenue from commercial loads is small the practice is to estimate the demand or else adopt a block energy rate, which for the given connected load recovers the expected demand in the higher revenue per kilowatt-hour from the initial blocks. A minimum charge helps also to recover a portion of the demand costs along with such customer costs as meter reading, billing, etc. The block rate for energy alone, however, fails to adjust the revenue to the true demand costs for a load that has a load factor varying much from that assumed in framing it. Of course even a demand charge based on metered demand is not precise because the capacity provided to meet the demand does not necessarily vary with the demand. For that reason a metered demand is commonly applied for the ensuing twelve months, or until exceeded.

Actual demand charges less than justifiable

Cost allocation for commercial and power usage will result in a different proportioning of items than has been cited for residential customers. Diversity factors are, in general, less for these classes than for the residence class. It is a moot question, however, whether all should not share equally in the benefits of diversity because it is created by the joint action of all of them. The most that can be said in a general way is that the business and service costs for commercial and industrial service are likely to be less in proportion to the fixed charges and operating costs. On the other hand, the large element of distribution fixed charge will be lessened because of the concentrated character of the load, especially in the case of general power customers. Taking all these variations into account, there is no occasion for recognizing any great difference in the proportion of demand cost to energy cost for commercial and industrial customers

Typical Percentage Revenue From Demand Charge

New England rates chosen at random show that the demand charge amounts to only one-half or two-thirds the proportion of the total bill which could be justified for it on a cost allocation basis.

Class	Connected Load, Kw.	Load Factor, Per Cent	Demand Kw.	Kilowatt-Hours	Charges: Customer	Charges: Demand	Charges: Energy	Per Cent Demand
Residence lighting	....	..	....	40	0.50	0.75	1.80	25
Residence cooking, heating.....	....	40	3	600	....	7.50	7.20	51
Commercial (1)...	10	30	8	1,728	1.00	16.00	74.12	18
Commercial (2)...	10	40	8	2,304	....	25.00	46.08	35
General power (1)	75	30	50	10,800	....	100.00	256.00	28
General power (2)	120	40	100	28,800	....	250.00	345.60	42
Large power (1)..	1,000	30	800	172,800	....	1,318.50	1,890.25	41
Large power (2)..	1,000	40	800	230,400	.....	1,187.50	2,131.00	36
Primary.....	5,000	40	4,000	1,152,000	....	4,470.00	7,510.00	37

Trend in New England Demand Rates

Hopkinson form of rate most popular for large usage. Area rate more frequent than the room count for residential service. The 15-minute demand interval is by far the most common.

Class	No. of Rates	Demand Rate Type: Hopkinson	Wright	Three Part	Other	Area Basis	Room Basis	Demand Determined By: Connected Load	Test	Meter	Time Interval: 15 Min.	30 Min.	60 Min.
Primary power	28	20	2	1	4	..	..	8	2	22	16	5	1
Large power	24	16	1	0	1	..	..	6	2	18	10	5	0
General power	73	26	12	0	2	..	..	27	11	30	16	0	1
Display lighting	12	0	2	0	7	..	..	5	0	3	1	0	0
Comm'l lighting	42	14	6	0	0	..	..	12	3	10	8	0	0
Commercial	68	14	9	6	2	..	..	27	9	21	4	4	0
Residence.....	93	22	19	13	1	32	20	4	0	1	0	0	0
	340	112	51	20	17	32	20	89	27	105	55	14	2

from the 2/1 or 3/1 ratio found for residential customers.

The demand meter or some method of ascertaining demand with accuracy is thus no less important than the registration of the watt-hour meter and may often be considerably more important. In fact, if they are merely assumed equal in importance, equitable treatment of the customer suggests that any estimate or measurement of demand be made within the same limits of 2 per cent error as is customarily stipulated for the watt-hour meter. It appears inconsistent to estimate the demand within 10 or 15 per cent and then strive to design, adjust and maintain the watt-hour meter so that it will have an accuracy eight or ten times as good as that. A study of one rate showed a possible 20 per cent difference in the kilowatt-hour block charge and a 12 per cent difference in the total bill for a 10 per cent error in estimating the demand applicable to a Wright rate. Such an inconsistency vanishes, of course, when one recognizes the cost of demand metering and the extreme difficulty in designing a rate that will be any more accurate than that one in charging on a true cost basis, considering the variations in cost of service from season to season, from customer to customer and even at different times of the day for the same customer.

Rate making is as much an art as it is a science. If, therefore, an examination of typical rate schedules discloses a difference in proportion of demand and energy charges from that previously found in the cost allocation study it is not to be unexpected. Taking load factors of 30 per cent and 40 per cent as being reasonable possi-

bilities in connection with most of the common load classifications, we find that the percentage of the demand charge in nine assorted rate schedules ranges from 18 per cent to 51 per cent. It just happens that the highest percentage arises in connection with a residential cooking and heating rate for heavy usage at high load factor and the lowest percentage for a commercial load of lower load factor.

Some might argue that the circumstances would justify a reversal of the percentages. The interesting thing, however, is that hardly any of the rate schedules approach the high proportion of importance attached to the demand aspect in the cost allocation. Customers have not been educated to the equity of the demand charge. They have an aversion to "paying for something they do not get." Demand charges are not as high a proportion of the bill as they often should be because rate experts flavor their schedules with a seasoning of public sentiment.

In New England practice the preference is greatly in favor of the fifteen-minute interval with the 30-minute a poor second and the 60-minute interval in very low estimation. Load factors have improved and loads have grown faster in general than the size of the largest load unit, so that the question of momentary demand as a rule has been simplified and there is little occasion to feel that an interval as long as fifteen minutes is too long. On partly thermal considerations the fifteen-minute period is too short to allow full heat capacity of system apparatus under momentary or even sustained peaks of load. The fifteen-minute period, however, takes better care of the dips in voltage occasioned by sharp, short peaks.

Demand limiters have a proper function

One factor that tends to confirm the present practices as to demand intervals is the trend toward the adoption by industrial customers of demand-limiting devices. This should certainly not be viewed as inimical to the interests of the utility companies. It is identical in effect with what the utilities strive to attain, namely, a better load factor. It definitely limits the magnitude of the momentary demand and to that extent cuts the average cost of the customer's kilowatt-hour to both parties. That, in turn, has the effect of promoting increased use; if that takes place under the same demand the load factor is improved and the utility makes an economic gain.

Perhaps some of the industry's worship of the kilowatt-hour unit accounts for insufficient prominence given to the demand charge in rate structures. Maybe the meterman's preference for the watt-hour meter instead of the demand meter accounts for it. Maybe the difference in cost of buying, testing and maintaining the two types of meters accounts for it. However, if demand meters were to cost half as much as watt-hour meters and be equally accurate, if they had the utter structural simplicity of the watt-hour meter, there would be more encouragement from the metermen and rate experts to support the executive tendency toward relying primarily for billing upon the indications of such meters. But in the last analysis adverse customer reaction is the principal deterrent to demand elements of charge rising to the prominence which economic equity commands for them. Education is the sole route by which this desirable aim can be accomplished.

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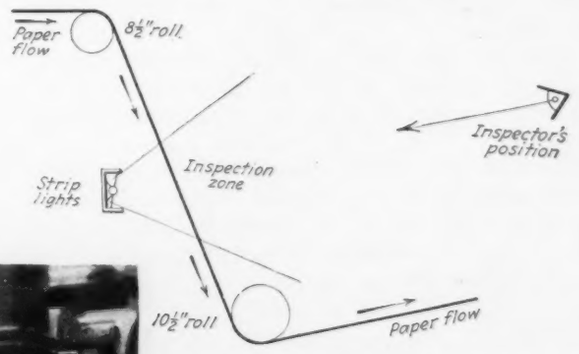
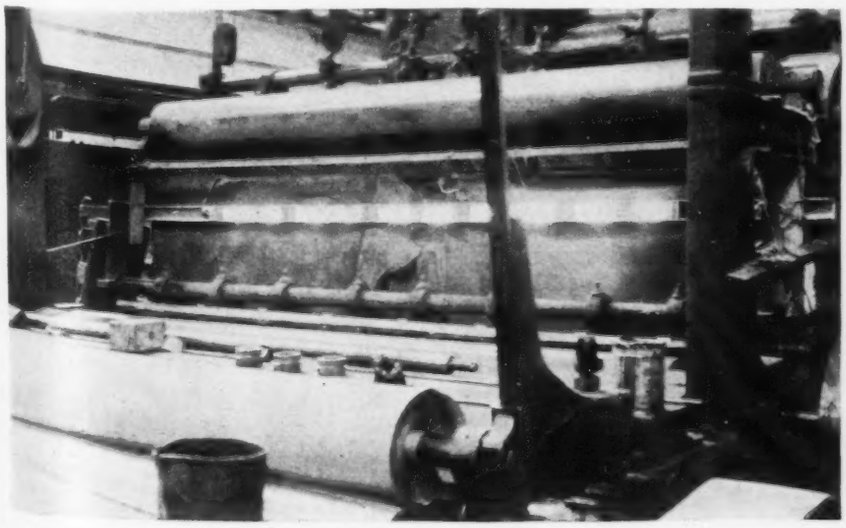
Lighting Aids Paper Inspection

In an Eastern white-paper mill the inspection of the product for flaws when flowing over rolls at 450 ft. per minute has been greatly facilitated by the installation of a Curtis "light strip," containing ten 25-watt "T 6½" intermediate base lamps about 9 in. behind the moving paper, replacing an old installation of bare lamps mounted in sockets on a board. The lighting device is mounted on the frame of the machine and is about 10 ft. long over all. It is readily cleaned of paper lint by blowing it off with compressed air. A zone of intense illumination about 24 in. deep increases the accuracy of rapid inspection when the process is under way and insures more certain spotting of defects. On certain orders the paper, if found defective, can be marketed as wrapping paper, and the grading of the product is greatly facilitated by the improved illumination.



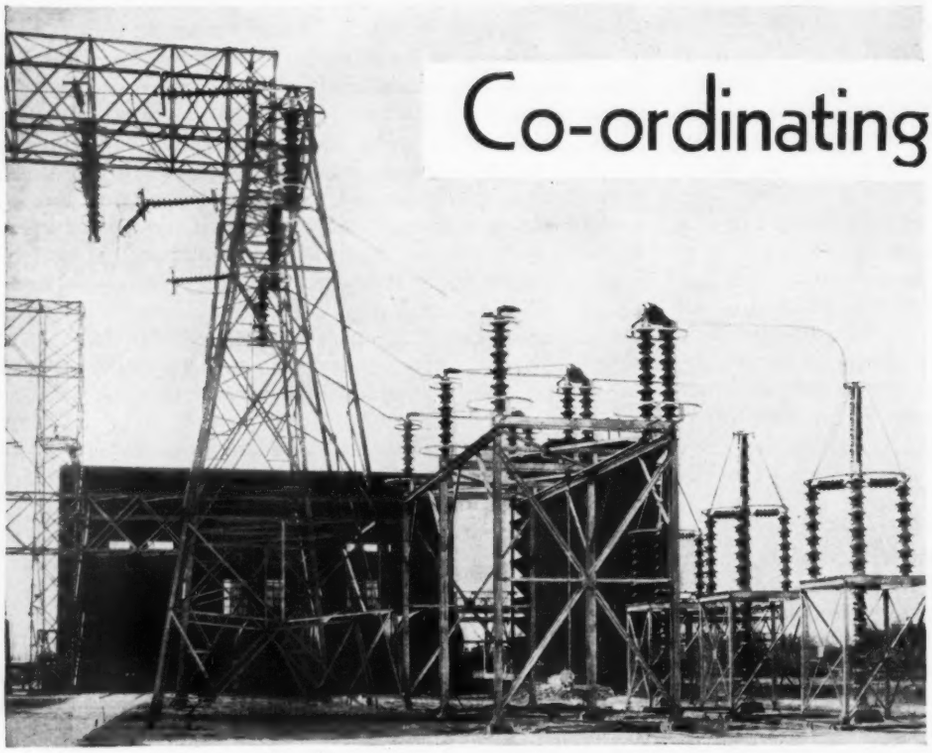
Arrangement of "light strip" with respect to paper flow



Illuminated "light strip" with paper roll removed from machine

Co-ordinating Insulation of Hig

By E. W. DILLARD*
Electrical Engineer
New England Power Engineering & Service Corporation



Bus lightning arrester installation on 231-kv. side of Tewksbury substation

THE increasing reliance upon transmitted power and the ever-growing demands of industry for better service have brought about a particularly comprehensive investigation of high-voltage line performance during the past decade. Much valuable information has resulted. Entirely new concepts have come into being and the application of high-voltage insulation placed on a much sounder basis. Protection designed against lightning rather than against the effects of switching surges, coupled with the application of spillway sections, provision of increased grounding facilities and better co-ordination of insulation generally, is bringing about encouraging progress in avoiding interruptions of service.

We have learned that the normal 60-cycle voltage and the dynamic overvoltage from switching surges and the like are of too low a magnitude to cause much trouble even with the minimum insulation usually employed. Switching surges greater than about 5.1 times line voltage have never been measured on a high-voltage line and the very large majority of such surges are under three times voltage. Thus on a 115-kv. system we have assurance that a switching surge greater than 480 kv. crest will never exist. Even a six-disk string would be safe against this voltage, for it has a flashover of about 500 kv. (crest, 60 cycles dry), and should therefore be entirely adequate for 115-kv. service if lightning voltages could be eliminated. Probably four disks would seldom flash over, because only a very few switching surges greater than 3.5 times line voltage have ever been measured. It seems safe to conclude that the insulation for a high-voltage line should be selected almost entirely for its performance during lightning.

All investigations show that lower voltage lightning disturbances are prevalent; i.e., that a given line will experience a much larger number of surges of low magnitude than of high values. This indicates that a small increase in effective insulation will make a large increase in the number of surges that will safely be withstood. A 50 per cent increase in insulation might easily reduce the number of flashovers to one-half. The degree to which this overinsulation is carried is determined usually by balancing the investment against the service security desired. Thus it is by no means inconsistent to provide as much—or even more—insulation on an important line as on a less important line of the next higher voltage class.

The lightning voltage that will be impressed upon high-

Table I—Comparison of Apparatus and Line Insulation

Rated Circuit Voltage, Kv.	Transformer 60-Cycle Test Voltage, Kv. R.M.S.	Corresponding No. of Disks Spaced 5.75 In.	Insulator 60-Cycle Dry Flashover Kv. R.M.S.	Impulse Strength of Insulators Kv. Crest*	Insulation of Line for High-Grade Service 60-Cycle Disks	Dry Flashover	Impulse Kv. Shielded*
69	139	4	250	635	6	350	975
115	231	7	400	1,010	8	450	1,260
161	323	10	550	1,390	12	640	1,790
230	461	14	725	1,840	15	770	2,160
					17	850	2,380

*Impulse ratio 1.8.

Table II—Insulation Levels in Recent New England Power System Construction

Line Insulation			Spillway Insulation			Bus Insulation			
Shielded Disks	Kv.	Flashover Gradient Per Cent	Shielded Disks	Kv.	Flashover Gradient Per Cent	Shielded Disks	Kv.	Flashover Gradient Per Cent	System Voltage, Kv.
15	2,150	157	13	1,900	165	14	2,030	200	220
8	1,260	85	7	1,160	98	7	1,160	100	115

From a paper before the Engineering Section, New England Division, N.E.L.A.

High-Voltage Lines

voltage apparatus is determined by the arrester performance or the flashover value of the line insulation. The voltage reduction accomplished by arresters is dependent upon arrester and ground characteristics, and in the case of very heavy discharges sufficient voltage may remain to cause insulation failure.

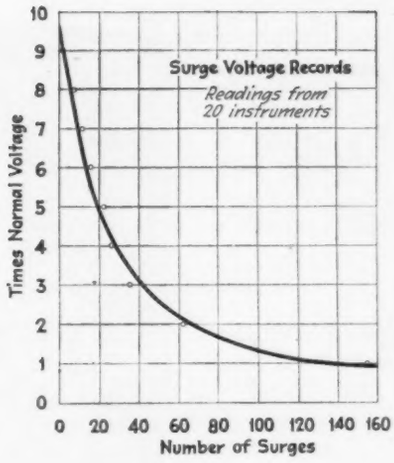
This, together with the fact that the arresters may be out of service, has brought the conviction that apparatus should be designed to withstand voltages equivalent to the flashover value of adjacent insulation. It can readily be seen that a large variation will always exist in the insulation levels of various lines and systems, and that it is undesirable to design apparatus for each special case. Manufacturing practice has effected a compromise in which the apparatus insulation level has been put at about the average level (or slightly lower) of insulation used for a given system rating.

Table I was taken in part from the proposed standard of the transformer subcommittee of the American Institute of Electrical Engineers. In substance it expresses the intent to insulate apparatus on a basis of the insulation afforded by standard 10-in. disks under lightning voltages. This basis is relatively easily achieved and demonstrated in the case of bushings and the like, but certain difficulties which cannot be discussed in this paper arise in connection with the insulation of transformer windings. The last three columns of the table indicate the amount of insulation usually applied to lines for a high grade of service. Materially more insulation is used in some cases. It appears that the line insulation would permit the apparatus to be subjected to about 25 per cent more voltage than it is designed to withstand.

Spillway applications in New England

It has become the practice of many companies to insulate bus structures generally at the same level as the apparatus and to provide a so-called spillway section in the lines to insure against a voltage in excess of the insulation strength entering the station. Usually these spillway sections have the same or one disk less insulation than the buses or the apparatus. Additional ground wires, etc., are installed over the spillway section, increasing the protection sufficiently to insure that it will have no more flashovers than the line itself. On the New England Power System such spillways have been installed at Fifteen-Mile Falls, Central New Hampshire switching station and Tewksbury on the 231-kv. lines and at Tewksbury, Pratt's Junction, and Millbury on the 115-kv. lines. Table II gives the insulation levels at Fifteen-Mile Falls and Pratt's Junction, these being typical of the others. All voltages are crest values and insulator strengths assume an impulse ratio of 1.8. Shielding has been assumed to increase the effective insulation 10 per cent.

Thus far there have been no flashovers in the spillway sections and it is believed that there is less probability of flashover in these sections than on the line proper. The sections are about 1 mile long and are all equipped with extra ground wires, installed as near as possible to the power conductors. Each 115-kv. bus is equipped with an arrester, making a total of two per station. One 231-kv. arrester is installed at Tewksbury and another at Fifteen-Mile Falls.



Surge voltage record from 2-circuit 110-kv. line for one season

Our experience indicates that grading rings offer a more complete protection to the insulator string and conductors against lightning than do arcing horns. Some approximate data on the number of disturbances per circuit-mile per year may be of interest in closing: For the original 66-kv. steel tower pin-type construction, with two circuits per tower; this figure was about 0.2. For the earlier 110-kv. two-circuit construction, with suspension strings, about 0.18. For later 110-kv. construction with one circuit per tower, 0.08. For 220-kv. construction with one circuit per tower (data from one lightning season only), 0.008.

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8 Cents per Mile for Trucks

From 5 to 31 cents per mile is the cost of operating a part of Pasadena's Municipal Light and Power Department's fleet of trucks. In the group are three Fords, two Reos, two Golden States and two Dovers, which combined traveled 59,846 miles. Three of them were operated for only seven and eight months. The total operating cost for the group was $5,037.07, representing an average figure of 8.4 cents per mile. The total cost of operating 36 cars and trucks during the fiscal year 1930-31 was $23,872.47, or 4.65 per cent of the entire operation account of the department as recorded in the recent annual report. Depreciation takes over 40 per cent of the annual automobile outlay.

	Annual Expense	Per Cent of Total	Cents per Mile		
			Minimum	Maximum	Average
Gasoline	$712.32	14.10	0.87	2.05	1.19
Oil	103.40	2.10	0.09	0.37	0.17
Tires	189.50	3.80	0.27	0.73	0.31
Sundries	774.38	15.40	0.70	2.97	1.29
Labor	1,150.83	22.90	1.25	5.98	1.93
Operating total	$2,930.43	58.30	3.06	10.73	4.89
Depreciation	2,106.64	41.7	0.89	20.90	3.52
	$5,037.07	100.0	4.94	31.29	8.41

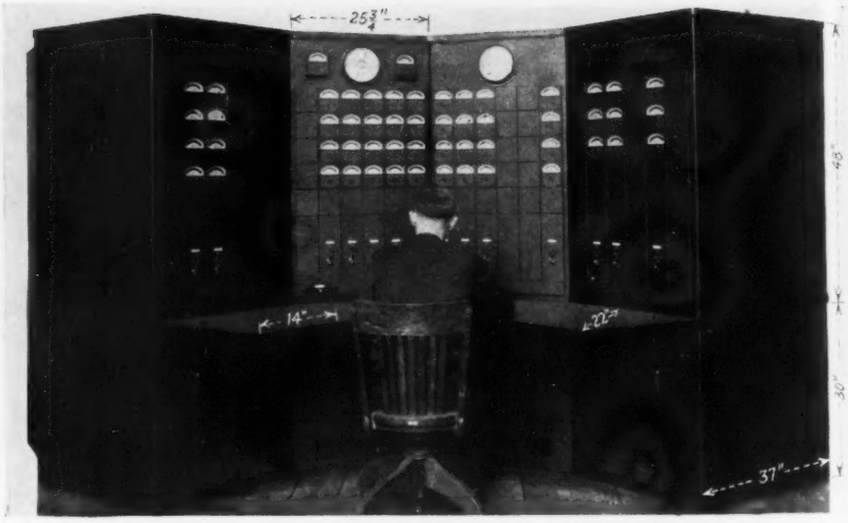
Aspects of Miniature Switchboard Design

By EMIL G. BERN
Switchgear Department,
General Electric Company, Philadelphia, Pa.

The type of switchboard for a modern power plant or substation is usually decided by an analysis of responsibilities assigned the operating force and maintenance department and by the relation of the plant to other power systems or important departments. In a small, self-contained, manually operated station, where perhaps two men tend the machinery as well as the switchboard, simplicity is more important than concentration. *Per contra,* where testing, meter reading, care of recording instruments and relay equipment are independent duties, there are good reasons for separating from the rest of the switching equipment devices which concern the operators only. For such conditions we may have a duplex switchboard, with the front side reserved for instrument and control devices that concern the operator, the rear mounting meters, relays and calibrating equipment perhaps on hinged panels to leave connections and interior parts in other than operating hands.

In this manner the physical space to which the operator gives his attention has been materially reduced and the duties of others have been separated somewhat from his attention.

Next comes the type of station where automatic equipment has been provided to take care of all ordinary functions of each machine or circuit, but where it is desirable to leave the supervision of the entire equipment to somebody who is in touch with more general conditions and

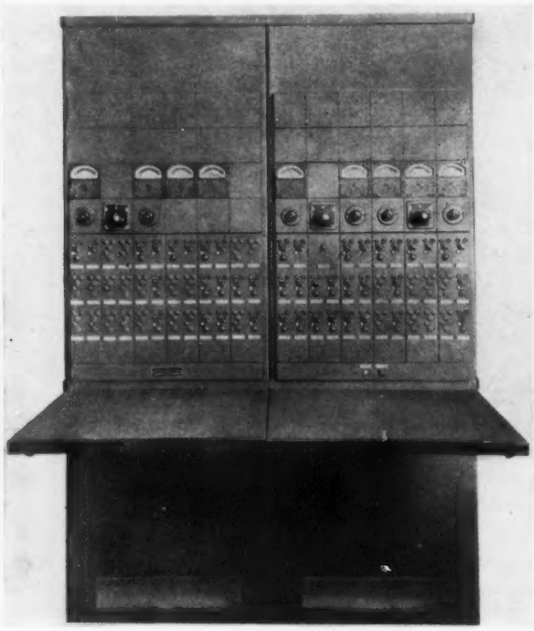


American Gas & Electric Company switchboard at Zanesville, Ohio

Six three-phase circuits require but 24 in. width, using three ammeters per circuit and usually one wattmeter. General instruments include a synchroscope, electric clock, voltmeters and control switch and pilot lamps for each circuit. The board controls two 132-kv. incoming lines, two 22-kv. transformer circuits, six 22-kv. feeders and one bus tie, two 6.9-kv. circuits, one station power circuit. Space for ten future circuits is allotted.

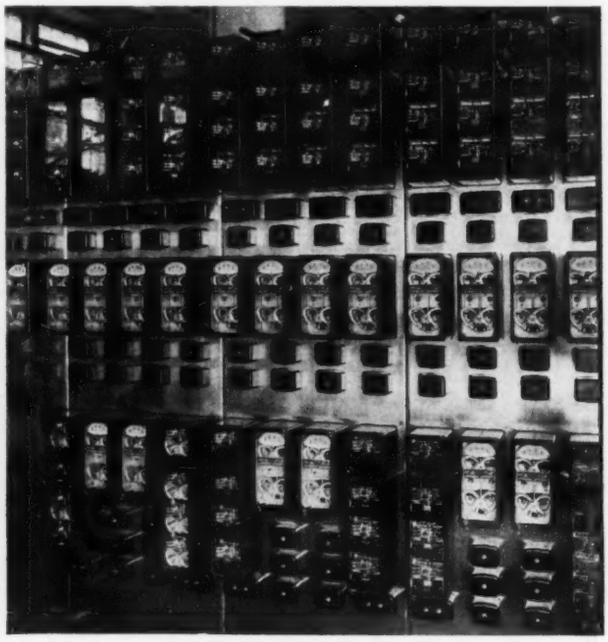
National Tube Company's switchboard at McKeesport

The width per circuit is 4 in. Nine motor-generator sets (ultimately eleven) are controlled from this location. Six substations house the sets. The instrument equipment consists of a voltmeter for each substation and a wattmeter for each machine. Twenty-five circuit breakers (ultimately 39) are controlled.



Typical meter and relay board at River Rouge plant of Ford Motor Company

Four circuits can be accommodated in this design on a 24-in. panel width. Contrasting this construction with the former conventional type of board carrying instrument, control, metering and testing equipment, the space saving is as 8 to 12.



may wish to reserve for himself a decision whether unit No. 5 will have a holiday in every seven days or in ten. This type of operator, or supervisor, naturally does not wish to be loaded with details of operation which can better be taken care of automatically. Furthermore, he may have certain desk duties attached to him. Obviously, the old conventional switchboard would not be ideal here. The hand that oils the pumps does not operate the supervisor's control switches; therefore, why should these devices be made large enough to resist misapplied force? Likewise, with a very much reduced display surface before him the instruments are easily read from one position even with smaller scales.

The equipment to be handled by the supervisor is of course dependent on the duties he expects to carry himself and those to be delegated to others. This supervisor may find it necessary to be in constant touch with several regional power systems by telephone while performing the more important switching operations. Here again the concentration of his equipment into the smallest feasible space is important. The relay, meter and testing equipment which may be installed in the same room must of course be designed to suit best its own conditions. Space is valuable in any modern power plant, but it is also important not to congest unnecessarily such equipment beyond practical limits of accessibility for maintenance, testing, etc. Sometimes the duplex construction of such meter and relay boards offers the most compact arrangement without undue complications. Local conditions usually determine this feature.

Since in the latest installations of so-called miniature switchboards the instruments are in all essential respects of the regular switchboard type, but with somewhat shorter scales, with control switches especially designed for this application, it is questionable whether the term concentrated control would not be more appropriate than miniature switchboards for the general conditions.

Local conditions must govern the type of installation selected, and costs will vary accordingly. In some cases the installation may be purely under the control of a supervisor, duplicating in functions the regular control and instrument equipment. Here the cost of the supervisor's board must be considered as an addition to the customary installation. In other cases, where concentrated control takes the place of conventional combined equipment, it is sometimes possible to effect an over-all saving in space, control connections and conduits.

▼

Canada Adds 546,650 Hp. in Depression Year

Despite adverse business conditions in 1931, Canada brought into operation a total installation of 546,650 hp. during 1931. This brings the total water-power installation in the Dominion to a figure of 6,666,000 hp. In addition construction was advanced on a number of undertakings and it is expected that 1,400,000 hp. will be brought into operation within the next two or three years. A detailed report, listed as No. 1,571, has been issued by the Dominion Water Power and Hydrometric Bureau of the Department of the Interior. Capital amounting to at least $110,000,000 was expended in transmission and distribution of new power developed in 1931, while more than $280,000,000 will be needed to complete the projects under construction.

Quebec took the lead during the year with installations totaling 382,200 hp., while additions by the other provinces were: British Columbia, 25,200 hp.; Manitoba, 79,000; Ontario, 58,200 hp., and Nova Scotia, 1,650 hp.

A summary of new installations completed during 1931 and of projects in process of construction has been compiled from the report and is presented in the accompanying tabulation. This covers only the activities that can be expressed in terms of horsepower of hydraulic installations. It does not take into account the very considerable amount of reconstruction, of stream control and shore protection and of preliminary work looking toward the development of new sites, on which further information can be found by referring to the report itself.

Hydro-Electric Construction in Canada

Installations Completed During 1931

Company—Plant	River	Head, Feet	Units and Hp.	Date	Ultimate Hp.
British Columbia					
The Powell River, Ltd.	Lois	375	1x24,800	March	49,800
Ashcroft Water, Electric & Improvement, Ltd.	Bonaparte	...	1x 400	.....	.....
Manitoba					
Northwestern Power, Ltd.—Seven Sisters	Winnipeg	41	3x37,500*	July	225,000
City of Winnipeg—Shave Falls	Winnipeg	...	2x12,000	Sept.	96,000
Great Lakes Power—Sault Ste. Marie	.....	...	1x 2,200	.....	.....
Ontario and Quebec Jointly					
Hydro-Electric Power Com. of Ontario—Chats Falls Ottawa Valley, Ltd.—Chats Falls	Ottawa	53	4x28,000	.....	280,000
Quebec					
Alcoa Power, Ltd. — Chute-a-Caron	Saguenay	...	4x65,000	.....	260,000
Gatineau Power—Paugan	Gatineau	...	1x34,000	.....	.....
Ste. Agathe des Monts Municipality	North	...	2x 300	.....	.....
The Shawinigan Water and Power—LaGabelle	St. Maurice	...	1x32,000	.....	.....
Nova Scotia					
Nova Scotia Power Commission—Rapid Falls	Mersey	...	1x 1,350	.....	.....
Annapolis Royal	Lequille	...	1x 300	.....	.....

Plants Under Construction

British Columbia					
Bridge River Pwr.—Seton Lake	Bridge	...	1x55,500	.....	55,500
West Kootenay Power & Light, Ltd.—Corrahinn	Kootenay	53	3x19,000	.....	57,000
Ontario					
Ontario Power Service Corp., Ltd.—Canyon	Abitibi	237	5x66,000	Fall of 1932	330,000
Quebec					
The Shawinigan Water & Power—Rapids Blanc	Upper St. Maurice	...	4x40,000	Nov., 1932	240,000
The Beauharnois Power Corp.—Beauharnois	St. Lawrence	...	.....	.....	500,000
MacLaren-Quebec Power—Masson Falls	Lierre	...	130,000	July, 1933	130,000
Ontario Paper	Outards	...	40,000	.....	40,000

*(Now only 55,000 hp. at reduced head).

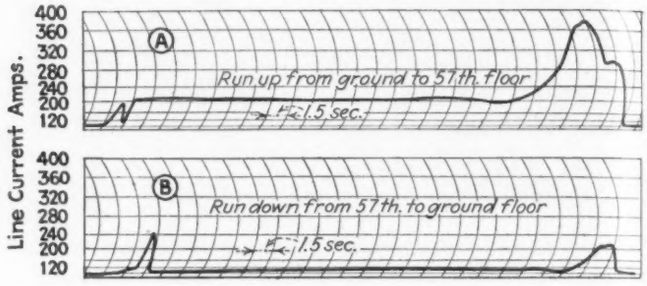
Operation of Elevators on A.C. Networks

By ANTHONY PINTO
Assistant Chief Engineer Otis Elevator Company

TO THE extent that the elevator represents an extremely important part in the operation of a building the system for supplying power to the elevator must be endowed with great reliability and suitable characteristics. The advances which have been made in the art of electric distribution, therefore, have enhanced the vertical transportation system and to that extent they have contributed to making possible the modern large-scale building projects.

Speaking particularly of the low-voltage a.c. network, the elevator art welcomes the further extension of this system of distribution, because of its greater reliability and the far less likelihood of the vertical transportation system being either entirely shut down or seriously crippled even for short periods. It would not be an exaggeration to say that a power shutdown is likely to have more serious consequences in connection with an elevator installation than with possibly any other type of utilization apparatus. We have no record of shutdowns due to power failure on a.c. low-voltage networks, with the exception of a case I would like to dwell on later, and which does not at all reflect upon the reliability of the low-voltage a.c. network. On the contrary, it simply points out certain pitfalls to avoid in its application.

In trying to arrive at some basis for the power distribution system it is not only the horsepower of the driving motor corresponding to the elevator lifting full load at full speed that has to be considered. Of greater importance than this are the current taken by the elevator motor while accelerating full load in the up direction and the current regenerated and returned to the line while decelerating full load in the down direction. During acceleration the elevator motor must impart kinetic energy to large masses, including its own mass, and, in addition, it must develop torque to lift the load. Similarly in stopping, the motor must not only offset the driving force of the full load in the down direction but must be able to dissipate the kinetic energy previously imparted to the moving masses. These are severe conditions, which are aggravated by the fact that it is necessary to reduce the time of starting and stopping to a minimum consistent with the physiological effect on the passengers. Hence, the necessity for large motor currents (Fig. 1) during the starting and stopping operations.



Figs. 1A and B—Large currents must be handled in starting and stopping elevators

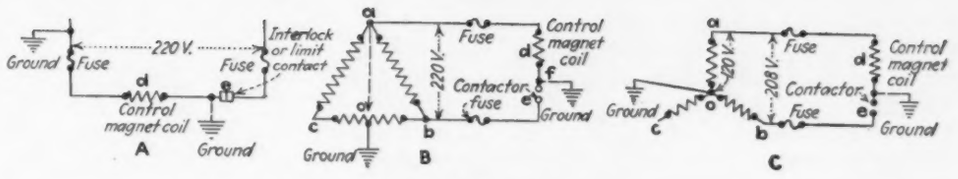
Curves apply to a unit multiple-voltage signal control elevator with a rated duty of 2,500 lb. at 1,000 ft. per minute; power supply 208 volts, three phase, 60 cycles; 2,575 lb. in car.

With the resistance form of control, limitations are soon reached because of the difficulty of securing sufficiently fast and smooth acceleration and retardation and the further difficulty due to the large magnetic contactors necessary to handle the large currents. On the other hand, with generator field control, a much smoother and faster operation may be secured. No large currents need be handled through contactors, as the necessary magnet switches merely control the field current of the generator, and, further, the acceleration and retardation current peaks, though large, are less steep than with resistance control. The combination of various elements typical of generator field control has made possible increasingly large duties on elevators, accompanied by steadily increasing current peaks. The a.c. low-voltage network has played its part in presenting a much greater voltage stiffness.

The better voltage regulation of the network system is particularly helpful to resistance-control installations where the voltage changes are directly translated into changes in the elevator motor torque and changes in magnet pull. This will be more fully appreciated when it is realized that the torque of an induction motor varies directly as the square of the voltage, and so does the pull of an alternating-current magnet. A resistance-control elevator connected to a widely fluctuating voltage is a very

Conditions have reached the point where the economic justification of major building projects hinges primarily upon the design and arrangement of the vertical transportation devices. Buildings which are being planned and executed today could not have been executed only a few years back. Therefore, it is of the greatest importance that the distribution system keep pace with the elevator art, and vice versa. The two are closely interlinked and may so greatly affect each other that advances in one art may have far-reaching effects on the other.

**Abstract of paper presented before the New York power group, A.I.E.E.*



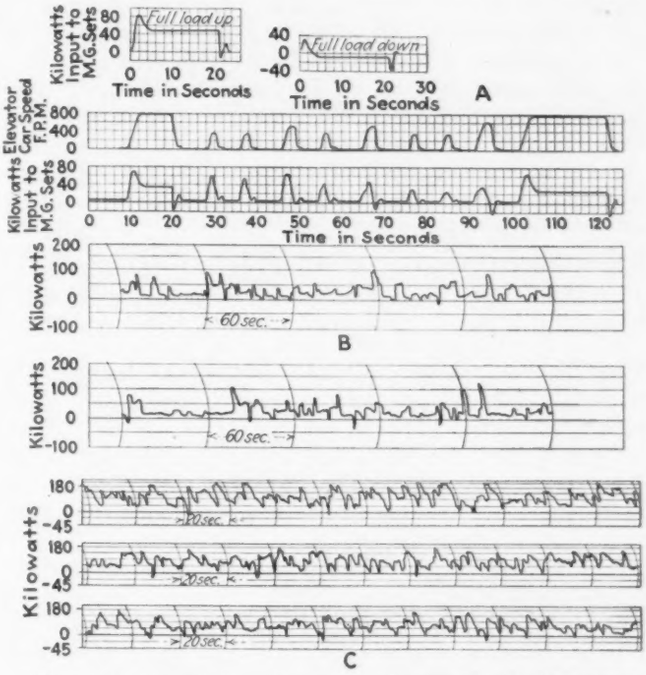
Figs. 2A, B and C—Control equipment must be placed so false operation will not be caused by accidental grounds

difficult mechanism to keep in adjustment and to maintain, for the magnet switches and motor and brake must be adjusted to perform their functions at the lowest voltage, with the result that when they are called upon to do so at the maximum voltage the magnet switches and brake are likely to slam in noisily and the motor is likely to give a bumpy operation in the car.

From the elevator standpoint the higher the voltage, within certain limits, the better, for the higher voltage reduces the contactor difficulties, making possible the use of lighter contactors for the same horsepower capacity. In the case of very large installations we would prefer a voltage as high as 400 to that of near 200 adopted in this country for the low-voltage a.c. network. For the average condition of elevator operation, however, a voltage near 200 is to be preferred to a voltage of near 400. Needless to say, we cannot have both and still avoid transforming apparatus between the network and the elevators.

Because of the more general use of the three-phase system, both in network and radial distribution form, the two-phase apparatus is more or less regarded as somewhat special, in so far as it requires slightly more complicated switching and involves some difficulties with the motor. The differentiation is so slight, however, that were conditions reversed, and were two-phase more popular than three-phase we would possibly raise no question about the two-phase apparatus. This is, therefore, a point with reference to general standardization of the number of phases rather than one of preference of one type versus another for elevator utilization.

An item of very great desirability to the elevator art is the fact that in the low-voltage a.c. network the grounded point is well known, is always the same and is symmetrical with respect to the three power lines. The importance of this will be more apparent if I mention that, above all things, an elevator installation must be made safe and the electrical control circuits protected by interlock and limit devices. The interlocks are electric contacts generally mounted on the hatchway doors and on the car door or gate, and sometimes elsewhere; the limits are another form of electric contact generally mounted at either end of the hatchway and, in addition, in some cases, on the car. All of these contacts are of such a nature that they are normally closed when the elevator is operating; the opening of any one of them should open the main control magnet switches and stop the car if in operation or prevent it from being placed in operation from standstill. It is, therefore, vital to maintain the interlocks and limits in operating condition or to be immediately advised if their operation has been made void. We find from experience that whenever any difficulty arises in connection with these contacts it is generally one of grounding. Therefore, we lay out our circuits with all or most of these safety devices placed on the ungrounded side of the power system (Fig. 2A), so that if a ground should occur on any of the safety contacts it will immediately show itself by blowing of the fuse, thereby de-energizing the control board. It is



Figs. 3A, B and C—Power requirements of elevators operating under three conditions

(A) Typical round trip of single express elevator during morning peak of filling an office building; first to twelfth floor express; twelfth to 24th floor local; 261 ft. rise.
(B) Feeder supplying group of three multi-voltage elevators.
(C) Feeder supplying six multi-voltage elevators. All have duty of 2,500 lb. at 800 ft. per minute.

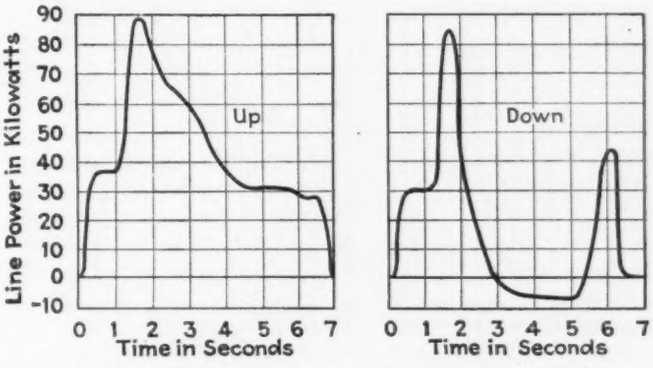


Fig. 4—Power-time curve of resistance-control elevator

Refers to geared elevators with rated duty of 3,750 lb. at 300 ft. per minute; power supply 220 volts, three phase, 60 cycles; operated by two-speed squirrel-cage resistance-rotor induction motor.

apparent, therefore, that since the grounded point in the network is always constant and symmetrical with respect to the power lines, there is no possibility of wiring the safety devices on the wrong side of the line.

There are some circuits in elevator controllers wherein it might be possible for some of the magnet switch coils to be energized and caused to operate, should some of the contacts which are not on the grounded side be

grounded. I refer particularly to the type of circuit exemplified in Fig. 2B, wherein the elevator control might be connected to points *a* and *b* of the distribution transformer, with the middle point of the transformer winding *b-c* being grounded at *o*. (*d* represents a control magnet coil and *e* represents some one contact which, on closing, energizes magnet coil *d*.) Suppose that this contact is accidentally grounded at the point marked *f*. It is evident that a voltage equal to the difference of potential between *a* and *o* would be impressed on the coil *d*; this is 190 volts for a 220-volt circuit. A magnet such as *d*, designed to operate at 220 volts, will undoubtedly operate at 190 volts, thus performing an operation which is not only false, but may prove to be dangerous. In circuits of the type shown, we take the precaution of connecting the control circuits to lines *b* and *c* instead of *a* and *b*, so that if a ground occurs at a point such as *f*, and under similar conditions, the voltage impressed on coil *d* will be 110 volts instead of 220. It is most likely that the magnet switch will not operate under these conditions. In the case of a network system, if a ground occurs under the same circuit conditions as outlined in the latter case, the voltage accidentally impressed upon the magnet coil will be 120 volts for a power voltage of 208, and the likelihood in this case is that the magnet switch will not operate.

The advent of the network has not been entirely an unmixed blessing, for the reason that the power and lights, also the radio apparatus, are thoroughly mixed. Therefore, it is desirable to pay closer attention than ever before to anything which would cause undue disturbances on the lines. From the elevator standpoint, we will be glad to co-operate in this direction, realizing the value of the system and its advantages in many directions. It is, nevertheless, to be fully realized that we are, as already pointed out, faced with the necessity of handling a load which, by its very nature, requires currents fluctuating between wide limits (positive to negative), and this basic condition is further aggravated, from both the power supply standpoint and the manufacturer's standpoint, by the fact that the time for acceleration and retardation must be reduced to a minimum.

A slight disadvantage of the network is its inflexibility from the voltage standpoint. I say inflexibility, because although it is possible to introduce transforming devices, such as an auto-transformer, between the network and the elevator apparatus, for the purpose of increasing the voltage on the entire installation, this would, we believe, be undesirable, as it would greatly vitiate the reliability of the network. We know of one case at least where an accident to an auto-transformer introduced between the network and the elevator apparatus tied up a very important elevator plant for what was considered a long time; this represents the only case of power shutdown so far known to us.

The possibility of an increase in voltage, due to a high-tension transformer feeder opening at the power station and the network switches failing to disconnect the low-tension side of the transformer from the network would, if it persisted for some time, be likely to disturb the elevator apparatus, especially if it is of the resistance-control type or even the generator-field-control type. The alternating-current magnet switches, brakes and even motors would suffer from an increase in heating, the magnets and brakes would slam noisily and the operation of the car would be very unpleasant. Elevator apparatus will generally withstand a 20 per cent increase in voltage for some time and will withstand much more than this momentarily. Nevertheless, it is most desirable that such voltage rises be materially reduced in value or eliminated altogether.

Regeneration is particularly important to consider in connection with the network system because of the protective relays used in connection therewith. The regenerative action of an elevator with a duty of 2,500 lb. at 700 ft. per minute is shown in Figs. 3A, B and C, for various conditions, such as one elevator operating, three elevators operating and a bank of six elevators operating. Comparatively large amounts of power are involved in regeneration, particularly on installations with generator-field control. In the case of resistance control with two-speed a.c. motors the regeneration effect takes place at a comparatively low efficiency and is less important (Fig. 4).

In changing over from an existing radial system to the network system a small change in the operating voltage is involved, namely, from 240 to 220 or 208 or 199 volts, and it becomes a question of how to handle the elevator apparatus existing in the district where the change is being made. There are a number of cases where the motor and the control do not need to be changed, except that adjustments in the various resistances have to be made to assure the motor developing sufficient torque at the lower voltage, and the magnet switches have to be adjusted so that they will safely pull in at the lower voltage; this also applies to the brake magnet. On the other hand, there are a large number of cases where adjustments such as previously spoken of would not produce as dependable an elevator installation on the lower voltage, and it is therefore necessary to make changes in the windings of the motor, the magnet switch coils and brake. This not only applies to ordinary resistance-type control, but also to generator-field control. Cases have arisen where the induction motor driving the motor-generator set of a generator-field-control installation has had its speed, under the accelerating conditions, reduced to such an extent as to keep the exciter from generating anything like the required voltage, thus very seriously hampering the elevator operation. A study, therefore, of each installation involved in the changeover is very highly recommended.

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Gives Electrical Data on French Cities

To meet inquiries about the kind of electric service in foreign cities and towns the electrical equipment division of the Bureau of Foreign and Domestic Commerce has been publishing a series of "special circulars." These circulars classify the information by countries and give, for each city, the name of the electric power company, the power plant capacity, the type of supply and, if it is a.c., the number of phases and the frequency, the low-tension distribution voltage, and, finally, the type of prime mover.

One of these compilations, designated as Special Circular No. 602, covering all cities in France with a population of 5,000 or over, and revised to February, 1932, has just been issued. About 400 places are listed.

Factory Operations Fail to Hold Gains

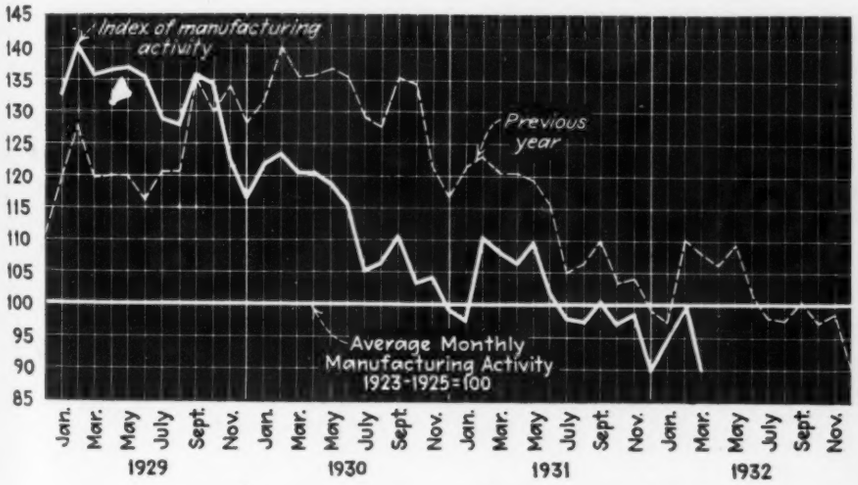
MARCH returns for electrical energy consumption, received by the ELECTRICAL WORLD and analyzed by industry groups, indicate decreased activity in most lines compared with January and February instead of maintaining the gains recorded in those months. The result is a decline in the general index, based on the weighted averages, of 11 per cent from February, 6 per cent from January, which brings it back to the low point of last December. Compared with last year the operations are down 19 per cent. While some of the figures are subject to revision owing to incompleteness of the returns, it is not probable that the changes will be large.

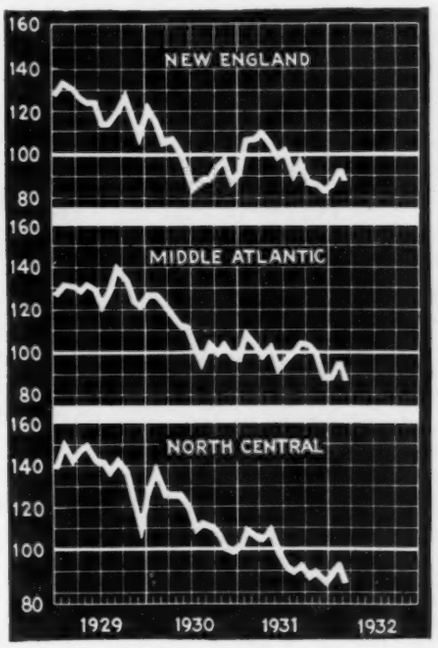
Among the individual groups gains are shown, compared with last year, in leather products, while chemicals and food products fell off but slightly. Textiles declined in the country as a whole and in the East but rose in the North Central region. In the construction industries the low level continues: Iron and steel, metal working and the earth products group all show figures that are smaller than in February and much under those of March, 1931. The automobile index, which during the past few months had been climbing steadily, reversed its direction, whereas in 1931 the usual rise occurred from February to March, though at a low general level compared with other years.

Regionally, New England makes the same showing as the country as a whole. Gains in iron and steel and in textiles were outweighed by losses elsewhere and made the average lower than in January. Rubber products gained compared with March, 1931.

In the Middle Atlantic States chemicals, foods, leather, and paper and pulp are somewhat higher than they were last year; losses in other lines, however, pulled down the regional average nearly as much as in the country as a whole. The North Central average is depressed by the state of the metal industries, including automobiles, though improvements are indicated in leather, forest products and textiles, compared with March, 1931. The resulting regional average is down 22 per cent.

Index numbers for the South and West will be published in the next issue.





Index of monthly manufacturing activity

Base: Average month 1923-1925 = 100.

(Corrected for number of working days, but not for seasonal variation.)

These data are compiled by ELECTRICAL WORLD and are based on monthly consumption of electrical energy by 3,800 large manufacturing plants in various industries and scattered throughout the country.

Industrial Groups	United States				New England				Middle Atlantic				North Central			
	Mar., 1932	Feb., 1932	Jan., 1932	Mar., 1931	Mar., 1932	Feb., 1932	Jan., 1932	Mar., 1931	Mar., 1932	Feb., 1932	Jan., 1932	Mar., 1931	Mar., 1932	Feb., 1932	Jan., 1932	Mar. 1931
All Industry	88.0	98.8	93.9	108.2	83.7	93.0	85.8*	105.8	85.4	94.5*	89.6	102.8	82.0	95.8*	89.5	105.7
Automobiles (including parts and accessories)	69.2	85.3	83.6	94.1	.....	.....	.....	.....	68.1	91.0	91.7	83.8	68.8	86.1	84.1	94.3
Chemical products (including oil refining)	128.5	137.1	134.3	139.3	132.9	147.6	149.7	178.9	150.1	149.1	145.6	142.8	105.5	131.0	117.3	126.4
Food products	114.9	129.5	127.2	116.8	.....	.....	.....	.....	86.4	101.5	95.8	80.9	105.1	115.0	110.8	117.5
Iron and steel	69.0	78.2	77.6	119.4	99.2	100.3	94.0	153.5	61.1	62.7*	73.0	106.6	69.7	82.0	76.2	120.2
Metal working	64.8	74.8	72.7	103.5	83.0	95.7	91.3	115.0	68.1	79.0	75.5	111.3	60.9	69.5	68.7	96.2
Leather products	86.7	90.6	81.4	71.2	72.6	82.8	72.8*	77.3	103.0	97.4	88.7	75.2	75.2	85.3	69.5	57.2
Forest products	78.2	86.8	81.9	93.2	39.6	45.4	43.2	48.2	42.6	54.0*	57.2	65.0	111.0	111.1	89.6	105.0
Paper and pulp	112.9	116.5	109.3	123.0	122.2	128.0	122.7	152.0	71.9	73.4	68.4	69.2	88.1	90.1	85.9	97.6
Rubber products	96.8	112.0	104.0	109.6	84.0	109.4	95.1	74.6	.....	.....	.....	.....	107.5	121.0	113.4	124.2
Shipbuilding	83.4	99.2	93.2	98.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stone, clay and glass	81.2	90.0	77.1	105.1	.....	.....	.....	.....	63.0	84.8	51.7	92.8	75.2	100.3*	106.7	94.5
Textiles	85.3	96.8	87.8	97.3	70.1	76.8	65.6	79.3	95.5	113.1	102.0	117.8	118.5	112.7	109.2	106.6

*Revision

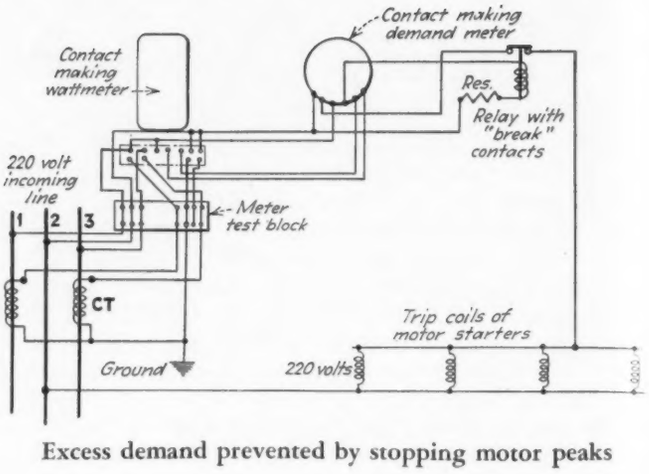
Demand Limited by Tripping Offending Motors

By GRADY H. EMERSON

Birmingham, Ala.

In these days of curtailed production it behooves industrial plants to watch the momentary demands created by fluctuating loads. One mill which faced large demand registration, even though consumption was down, decided to install some means of controlling the peak demand. A standard polyphase wattmeter was provided with a ratchet-contacting device for actuating the demand meter, which had a contacting device which could bet set at some predetermined load. A relay was then connected in series with the demand meter contacts so that it would open the relay contacts whenever the load exceeded the predetermined value.

The relay could thus be used to sound an alarm or automatically trip out some portion of the load. In this instance the alarm contacts were used to close the circuit of a relay the contacts of which were normally closed. Upon excessive demand the relay opens its contacts, which are in series with the trip coils of the starters of five motors totaling 165 hp. These motors were responsible for the excess peak. Not all of these motors were operated at one time, but it was desirable to prevent the operation of any which would make the demand exceed the tolerable amount.



Excess demand prevented by stopping motor peaks

The method could be extended to provide for the restarting of any motors which had been shut down by the demand-limiting devices, but attendants are near at all times so that the extra expense was not considered justifiable.

It is considered that such an installation is beneficial to both utility and power customer. Decreased power bill is admittedly the object, but that leads to a satisfied customer. It induces him to add more load and more kilowatt-hours because he feels he has control over the amount of his bill. An immediate consequence is better load factor, the economic aim of all utilties in their load-building programs.

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READERS' FORUM

Resents Attitude Toward Municipal Systems

To the Editor of the ELECTRICAL WORLD:

We are not pleased with the attitude which ELECTRICAL WORLD displays toward the many successful and efficiently operated municipally owned electric utilities throughout the country. As you probably know, there are many which contribute more to the well-being of the people they serve than any privately owned utility.

We in McPherson believe we have an outstanding electric utilitiy by any comparison. Our utility does not have one cent of outstanding indebtedness, having amortized all outstanding bonds which have been issued. Our rates for all classes of service are as low as or lower than those of any privately owned company in comparable sized cities in Kansas. Our charges for street lighting are less than one-half those charged by privately owned companies in cities of the same size in this state and this difference more than offsets what we would be required to pay in the way of taxes. We have recently built a white way out of department funds which is the most modern of any city in this state. On top of all this we are turning over to the general fund of the city $25,000 which will enable the city to cut its tax levy from 12.4 mills to 9.4 mills. Our reliability of service can be compared with any plant.

Now, when we have this type of a utility we like to feel that we are doing as much for our customers as any one and that we are really serving our community instead of being classed as Bolshevik, radical or demagogue. The attitude of the privately owned companies and the press which serves them toward municipally owned and operated utilities is doing more to convert the people to the principle of municipal ownership than any other one thing.

I would like to offer the suggestion to your magazine that you place therein a department for the municipally owned utilities. You can make your own investigations and give credit where credit is due. Municipal ownership of public utilities is expanding rapidly in this state and you will have to take more notice of them than you have in the past. We are all trying to serve the public in as just and equitable a way as possible—the privately owned companies in their way and we municipally owned utilities in our way—so why not give equal credit to both. There are probably more poorly managed privately owned companies than there are poorly managed municipals because there are more privately owned companies, and I think we should get over the idea that a utility is poorly managed just because the people own and operate it.

The above comments are given for what they are worth. I have written you frankly about your magazine and I think I have offered a constructive suggestion. I like your magazine, even with the above faults as I see them, and occasionally an article appears that is worth the whole year's subscription.

McPherson, Kan. **L. C. ANGEVINE,**
Superintendent Water and Electric Department.

Men of the Industry

E. B. Freeman Heads Sturtevant Company

E. B. Freeman, for many years vice-president and general manager of the B. F. Sturtevant Company, Hyde Park, Mass., has been elected president, succeeding former Governor Eugene N. Foss, who becomes chairman of the board of directors. Mr. Freeman was educated at the Worcester Polytechnic Institute in mechanical engineering, and since his graduation has spent the greater portion of his career with the Sturtevant company. From early connection with the sales engineering department he rose to the post of manager of the power apparatus department, later becoming general manager.

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ARTHUR E. KENNELLY, professor emeritus of electrical engineering of Harvard University and the Massachusetts Institute of Technology, was made the recipient April 8 of the medal of honor for 1932 of the Institute of Radio Engineers at its twentieth anniversary convention in Pittsburgh. The accompanying citation stated that the medal was awarded to Dr. Kennelly "for his studies of radio propagation phenomena and his contributions to the theory and measurement methods in the alternating-current field which now have extensive radio application."

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FRANK L. AIME, who has been connected with the Utility Management Corporation, New York, for the past seven years, has recently joined the staff of Gibbs & Hill, consulting engineers, New York. Mr. Aime was formerly identified with Walter Kidde & Company, the Washington Water Power Company and with the electrical engineering department of Stevens & Wood for two years. In his new position he will be engaged in an assignment on high-voltage cables in connection with the electrification work Gibbs & Hill is undertaking for the Pennsylvania Railroad.

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W. S. VIVIAN, until recently vice-president in charge of public relations for the Middle West Utilities Company, has just joined the sales organization of Grigsby-Grunow Company, to contact public utilities in the interest of the Majestic refrigerator. Mr. Vivian has had a long and interesting career of 32 years in the electric railway, telephone and general utility fields. He became associated with the Middle West Utilities Company in 1923 as director of public relations. More recently he served as chairman of the public-speaking committee of the National Electric Light Association, which developed these activities to upward of 30,000 talks a year.

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J. F. Becker Vice-President of New York Utilities

Joseph F. Becker, sales manager of the United Electric Light & Power Company, has been elected vice-president in charge of sales of the New York Edison

and the United companies. Mr. Becker has been sales manager of the United company since 1909, when he was transferred to that company from the Brooklyn Edison Company, where he had served successively as meter clerk, superintendent of the meter department and general sales agent since 1890. He is a director of the Brooklyn Edison Company.

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JOHN W. BAUMGARTNER has been elected president of the Los Angeles (Cal.) Board of Water and Power Commissioners to succeed Arthur Strasburger, who had held the office for more than a year. Mr. Baumgartner was appointed to the board March 10 by Mayor John C. Porter to succeed O. T. Johnson, who resigned because of illness.

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NORMAN L. TOWLE, assistant professor in eletrical engineering in charge of the electrical laboratories at Cooper Union since 1924, has been given charge of the department of electrical engineering with the rank of full professor. He has been on the staff of the Cooper Union Institute of Technology since 1920, having previously taught for a year at Iowa State College, Ames. A graduate of the Worcester Polytechnic Institute, Worcester, Mass., where he received the degree of bachelor of science in 1917 and of electrical engineer in 1921, he was connected for two years with the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. Prof. Towle is a member of the American Institute of Electrical Engineers.

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VINCENT D. KENNEDY, formerly secretary to ex-Governor Young of California and for the past year examiner with the State Railroad Commission, has been named southern California representative of the commission.

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STANLEY GREEN has been named chief engineer of the Duncan Electric Manufacturing Company, succeeding the late Jesse Harris. Mr. Green joined th Duncan organization in 1929 and since that time has been on the engineering staff of the company. In 1918 Mr. Green was graduated from Purdue University in electrical engineering and the professional degree of electrical engineer was received by him from this institution in 1922. Following employment with the Westinghouse Electric & Manufacturing Company, and later with the Esterline-Angus Company, Mr. Green in 1924 became meter engineer for the Central Indiana Power Company at Indianapolis, Ind., and spent five years in this capacity. While in this position he was a member of the meter committee of the National Electric Light Association. In addition to his duties as chief engineer he also serves as secretary of the Duncan Electric Manufacturing Company.

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PROF. GEORGE F. BATEMAN has been placed in charge of the schools of engineering of Cooper Union with the title of acting dean to succeed the late Francis M. Hartmann. His quarter of a century connection with the Union has been interrupted only by eighteen months of naval service during the World War. Appointed assistant professor of mechanical engineering in 1919, Professor Bateman was entrusted with the task of developing instruction in that branch of engineering at Cooper Union. He formulated the present curriculum of the day mechanical engineering course. In 1925 the department of mechanical engineering was separated from that of electrical engineering and Professor Bateman was promoted to a full professorship in charge of the department. In this capacity he has been responsible for the enlargement of its laboratories to more than double their former size and to their present inclusion of the major branches of the field. At present he is a member of the library

board of the United Engineering Trustees and of the subcommittee on scientific abbreviations of the American Standards Association. He is a fellow of the American Association for the Advancement of Science and a member of the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education.

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B. S. BESSESEN, an associate electrical engineer in the United States Civil Service, who has been acting superintendent of the Muscle Shoals Development, Ala., for the past year, has now received the appointment as superintendent. Mr. Bessesen has held responsible positions in power development projects in the west and from 1922 to 1924 was instructor in electrical engineering at Oregon State College.

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T. A. BUSBY, meter engineer of the South Carolina Power Company, has been promoted to supervising meter engineer of the southern group of the Commonwealth & Southern Corporation's operations. Mr. Busby succeeds the late S. A. Fletcher of Birmingham, Ala., under whom he had received much of his meter experience in Alabama. Birmingham will be his headquarters.

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OBITUARY

Halford Erickson

Halford Erickson, vice-president in charge of operation of the Byllesby Engineering & Management Corporation, died April 7, at his home in Oak Park, Chicago, following an illness of several months. Mr. Erickson, who was called "the father of utility regulation," was one of the best-known operating executives in the public utility field. He was 68 years of age.

Mr. Erickson was born July 7, 1864, in Sweden. He attended both colleges and universities, enjoying liberal educational advantages in his youth, but has largely pursued special studies in law and economics, including finance, statistics and similar lines. He has resided in Minnesota, Wisconsin, Illinois and other states.

While devoting his attention to railroading and abstracting, he served as Industrial Commissioner of Wisconsin from 1895 to 1905, and was then appointed a member of the newly created Railroad Commission and served thereon until 1916, when he resigned to enter private practice. In 1918 he became associated with the Byllesby organization, having charge of the Louisville properties for several years. In 1923 he was appointed vice-president in charge of operation, Byllesby Engineering & Management Corporation, the operating company of Standard Gas & Electric Company, and has served in this capacity ever since.

Because of the part he played in establishing Wisconsin law and the decisions which he largely fixed in the early stages of public utility regulation, he was sought in council by the public service commissions of states where these bodies were newly created. When he resigned as chairman of the commission in 1916, he was the only member who had served continuously since its establishment in 1905. The enviable reputation which this commission enjoyed was declared to be due in no small measure to the efficient and untiring efforts of Mr. Erickson as its chairman.

As chief operating executive of the properties in the Byllesby system, he occupied a prominent position in the public utility field. He was well known as an authority on public utility regulation and on holding company control and management, as well as on franchise, valuation and rate questions. He delivered addresses before such organizations as the National Association of Railroad and Utilities Commissioners, various state commissions and utility associations and published many articles on group utility management and finance and allied subjects, several of which appeared in the ELECTRICAL WORLD.

In addition to being vice-president of Byllesby Engineering & Management Corporation Mr. Erickson was vice-president, director and member of the executive committee of a number of subsidiary companies in the Standard Gas & Electric Company system, as well as of Standard Gas & Electric Company and H. M. Byllesby & Company.

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ALLISON J. VAN BRUNT, director of safety education for the Public Service Corporation of New Jersey, died April 5, of heart disease, in his seventieth year. Mr. Van Brunt was a member of the National Electric Light Association, the American Gas Association, National Safety Council and the American Society of Safety Engineers.

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JOHN J. KENNEDY, head of the Kennedy Advertising Agency, New York, and a member of the Edison Pioneers, died April 2. Mr. Kennedy was born in Hoboken, N. J., in 1873. He was connected with the Edison General Electric Company when the late Thomas A. Edison was its president.

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JAMES A. BEATTY, Canadian engineer, was found dead beneath his automobile March 28 in Toronto, apparently overcome by carbon monoxide. Mr. Beatty, who was 53 years of age, was a member of Morrow & Beatty of Peterborough, Ont. He was born at Fergus, Ont., and early in his career engaged in engineering work in the United States. In the past decade Mr. Beatty had been associated with many Ontario Hydro-Electric Power Commission projects.

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ROBERT A. COCHRAN, 75 years of age, retired textile and utility man of Maysville, Ky., died March 24, at his home in that city, following a long illness. Mr. Cochran was formerly president of the January & Wood Company, operating a large textile plant, an outgrowth of which was separate power, street car, gas and other utility operations, all of which were disposed of some years ago. The power interests were sold to the Kentucky Power & Light Company, which is now controlled by Insull interests and operated by the Kentucky Utilities Company. Mr. Cochran retired twelve years ago.

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WILLIAM D. MACQUESTEN, early associate of Thomas A. Edison, died April 9, at his home in Mount Vernon, after a long illness. He was 72 years of age. Mr. MacQuesten was born in Wentworth, N. H., in 1859, and was graduated from Phillips-Andover Academy in 1879. He attended Yale, but left during his senior year to join the Thomas A. Edison Company in New York. In 1883 he became chief electrical engineer for the Adams Electric Railway & Motor Company of St. Louis, but returned later to the Edison interests. Subsequently he established himself as an engineer and electrical contractor with offices at St. Louis and Kansas City. In 1888 he removed to New York. Mr. MacQuesten continued his own business for many years, retaining his Edison connection through his interest in the Sprague electrical companies. As a public official of Mount Vernon he served as Alderman, Commissioner of Public Works and as Mayor.

Trade News

Electric Storage Battery Company, Philadelphia, announces the appointment of Frank Kalas, formerly district manager, to the position of assistant general sales manager.

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W. M. Cory, formerly sales manager of the Moloney Electric Company, St. Louis, Mo., is establishing a sales agency at 907 Roosevelt Building, Indianapolis, Ind. Mr. Cory plans to handle four or five lines of equipment, principally of the kind used by utility companies.

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Fairbanks, Morse & Company have taken up their new Boston quarters on the sixth floor of the T-Wharf Building, 178 Atlantic Avenue, Boston, Mass.

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Charles H. Cutter, Seattle, Wash., district manager for the Pacific Electric Manufacturing Corporation, has again been appointed manager for the Portland and Oregon district.

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For the fifteenth consecutive month sales of Rollator refrigeration showed a gain over the same month of the preceding year, according to a statement issued by Howard E. Blood, president and general manager of Norge Corporation, Detroit, division of Borg-Warner. Sales for the first quarter, ended March 31, 1932, were 241 per cent of the corresponding quarter last year, while sales for March, 1932, were 151 per cent of those of March, 1931.

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Leeds & Northrup Company has just issued a completely revised edition of catalog No. 40, "Apparatus for Electrical Resistance Measurements." Two new a.c. resistance units are described.

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Norma-Hoffmann Bearings Corporation of Stamford, Conn., manufacturer of ball, roller and thrust bearings, announces the removal of its New York sales office, from the Grand Central Terminal to new and larger quarters in the Commerce Building, 155 East 44th Street.

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E. C. Bossler, resident engineer for Curtis Lighting, Inc., in Seattle, has been transferred to New Orleans. The company's headquarters are at 1123 West Jackson Boulevard, Chicago.

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H. B. Squires Company, San Francisco, Calif., has been appointed Pacific Coast representative for the porcelain line of J. H. Parker, New York City. A stock of knobs, tubes, cleats and similar supplies included in this line will be warehoused in San Francisco, Seattle and Los Angeles.

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Copeland-Schlageter Company has been organized by G. O. Schlageter, its president, to handle the distribution of Copeland refrigerators in southern California and Arizona. Headquarters have been established in the Overland Terminal Building, Los Angeles. J. M. Tenney is general sales manager and the parts and service department is under the direction of Larry Robertson. Jay Kennedy, Pacific Coast regional manager for the Copeland Company, will make his headquarters with the Copeland-Schlageter Company when he is in Los Angeles .

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Hollup Corporation, Chicago, has opened a Pacific Coast factory at 5701 Green Street, Emeryville, Calif. Welding machinery, electrodes and accessories will be manufactured at this plant for Pacific Coast distribution. E. J. Shuler is manager of the Western division.

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A new bulletin published by the Monitor Controller Company of Baltimore explains the manner in which the Monitor accelerator employs electromagnetic balance to solve the problems and to produce constant-torque acceleration. Beginning with the "ideal start" and going on to the various types of load, the bulletin takes up torque, current, resistance and interlocking. It explains the various features of the monitory accelerator, namely, complete independence of one coil from the other, the constant continuous pull of the shunt-closing coil, the long air gap in the lock-out coil and non-sensitive adjustment over a wide range.

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Edison General Electric Appliance Company, Inc., has announced the appointment of C. E. Allen as supervisor of sales and engineering on General Electric Hotpoint water heaters for the states of Utah, Arizona, Nevada and California and the western half of New Mexico. The headquarters of this newly created water heating division for this territory are at 846 Russ Building, San Francisco, Calif.

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Louis Allis Company of Milwaukee has appointed Sterling Electric Motors, Inc., as its sales representative on the Pacific Coast, to handle explosion-proof motors and standard squirrel-cage motors in sizes up to 250 hp., direct-current motors, frequency converters, inverted rotary converters and other types of motors.

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Baldwin-Southwark Corporation of Philadelphia has just issued bulletin No. 28, descriptive of Southwark-Emery testing machines. The bulletin, amply illustrated with descriptive material, including photographs and diagrams, is designed to constitute a short textbook on hydraulic testing machines.

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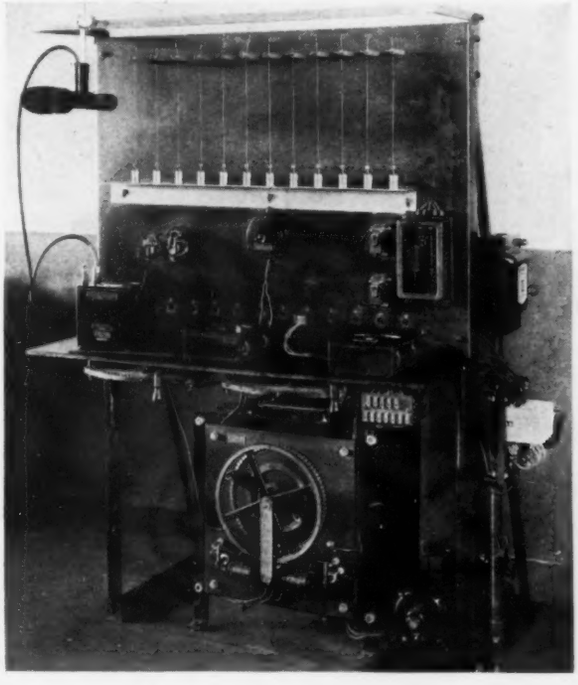
Why Toasters Now Last Longer

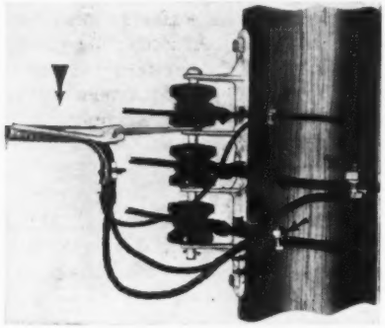


Here is a typical example of care in production that explains why the performance of present-day electric heating devices of good quality can be depended on. This is a recently developed machine for accelerated life testing of nickel-chromium heating wire in the plant of the Hoskins Manufacturing Company, Detroit, Mich. The test simulates actual use by alternate two-minute periods of current on and off. When oxidation has so decreased the diameter of a wire as to raise its hot resistance 10 per cent, the end of useful life is assumed to have been reached, although the wire will continue to carry current much longer before finally breaking.

New Equipment Available

Dead-End Service Clamp Protects the Cable

A dead-end service cable clamp for use in clamping multiple-conductor braid sheath cable is announced by the James R. Kearney Corporation, St. Louis, Mo. It is used for an economical fixture for dead-ending where cable is used for service drops. The clamp is designed with long, carefully rounded surfaces so that no injury to the insulation can occur, even at strains well in excess of those encountered in actual service. The clamping action is a combination of the wedge, capstan and snubbing principles, so arranged that slippage is eliminated. Fittings are available for making attachments on houses and also for connecting a strain insulator in series with the clamp.



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Modified Bus-Type Wiring Introduced Abroad

Marketed under the trade name of "Riserrod" by Grierson, Ltd., England, a system of energy distribution said to offer numerous advantages is now in use in England.

The system involves solid copper rods or tubes insulated with closely fitting sleeves of micanite 1 mm. thick. Distribution panels are set as nearly as possible vertically above each other and one set of rods or tubes is run vertically from basement to roof so that taps are made to outlets with short lengths of normal wire or cable. Connecting of the fuse panels to the "Riserrods" is accomplished by cutting away short lengths of the micanite sleeve, applying a clamp to the rods and fastening the cable to the clamp.

It is stated that by grouping the whole of the supply to one set of conductors any normal addition to the connected load forms only a small percentage of the total load, whereas it would call for a substantial addition to the floor load. As normal temperatures have no effect on micanite insulation there is no practical limit to the permissible loading, whereas rubber and paper insulation would be seriously damaged.

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A NEW HEATER CORD SET, type C-H, is announced by Cutler-Hammer, Inc., Milwaukee, Wis. This cord set is guaranteed by the manufacturers against all ordinary defects in workmanship and materials, against breakage of the attachment cap, burnout of the contact clips, breakage of the connector and breakage of the cord in normal use. Its rating is 10 amp., 125 volts; 5 amp., 250 volts. It is suitable for the new type 1,000-watt electric flatirons.

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Lifting and Tiering Trucks of Low Over-all Height

A lifting and tiering truck that will pick up cleated loads with 2-in. underclearance is announced by the Clark Tructractor Company, Battle Creek, Mich. It differs from the ordinary lift truck in that the load is carried on tapered steel fingers, with a standard length of 26 in., which touch the floor in down position. Fingers tilt back slightly in first 5 in. of rise, insuring balance for the load. Extreme flexibility is secured by four-wheel steer and rear-wheel drive. The speed per hour is from 1 to 6 miles. While it is capable of tiering to a height of 50 in., the low over-all height of the machine makes it ideal for loading box cars.

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Stud-Tube Walls in Regular Production

Availability of the new stud-tube water-cooled furnace wall of the Babcock & Wilcox Company is announced. The new wall structure possesses many novel features which are interesting, but the manufacturer stresses the economic importance of the stud-tube construction, stating that results fundamentally the same as those secured from the Bailey block-covered wall may be attained in certain applications with a lower investment.

The studs welded to the tubes serve as a mechanical means of securely holding the refractory and slag coating to the tubes and as conductors of heat from the wall coating into the water-cooling tubes. The coating affords protection to the tubes in furnace zones of exceptionally high temperatures.

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HIGH-VOLTAGE X-RAY TRANSFORMERS of new design, for operating the Lauritsen X-ray tube for cancer research, have been built by the General Electric Company at Pittsfield, Mass. Each has a rated capacity of 0.03 amp. at 700,000 volts effective to ground continuously. They are intended for operation in series with neutral grounded, giving 1,400,000 volts effective, or 2,000,000 crest volts, at the X-ray tube. This is sufficient to produce X-rays at a frequency and penetration comparable to those with radium. The transformers resemble large high-voltage terminals, in effect being built within the insulating casing of 700,000-volt terminals.